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UNIVERSITY OF ALBERTA
COLLEGE OF AGRICULTURE

Swine Production in Alberta

BY

DEPARTMENT OF ANIMAL HUSBANDRY

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Distributed by
Department of Extension, University of Alberta
Edmonton, Alberta, Canada

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BEAR IN MIND

1. Pigs will produce more meat from 100 pounds of feed than any other farm animal.
2. The pig will eat and grow and finish on a greater variety of feed than any other animal on the farm.
3. Pigs multiply rapidly so that the money invested in a sow is quickly returned.
4. Pigs constitute a reliable source of revenue and provide the farm table with a high class meat product.
5. According to 1935 statistics, there were nearly one million hogs in Alberta; this Province is the second largest swine producer in the Dominion.
6. Success in pig raising depends upon the use of good breeding stock of the proper type, together with good feeding and management methods.
7. One of the main problems in swine raising in Alberta arises out of the scarcity of skim-milk. Tankage or some other substitute should be used in its place.
8. Alberta grown grains—oats, barley and wheat—when properly supplemented will produce as good bacon hogs as can be produced anywhere in the world.
9. Pigs should be kept year in and year out. Over a period of years they will provide a profitable outlet for farm grown grains and farm by-products.
10. Control of diseases and parasites is essential to success in pig raising. Diseased pigs or those infested with worms are a liability rather than an asset.

PREFACE

Since the swine herd was established at the University of Alberta in 1917, some 10,000 pigs have been farrowed. These pigs have been utilized in a variety of ways. A certain percentage have been shipped throughout the Province to assist in improving the quality of commercial pigs; a considerable number have served as material for student judging classes, but the majority have been used in the carrying out of experimental work.

During the past 20 years exactly 100 swine feeding experiments have been conducted. Information has been gathered on a fairly wide variety of swine feeding problems. The object in conducting these experiments has been to gather information which would be of value to the swine raisers of Alberta and to assist in establishing principles which would have an application in swine raising in any country.

The material which is presented in this bulletin, which now goes into the third edition, is based in the main on the results of our own experiments. Sections dealing with curing pork on the farm, swine diseases, and swine raising equipment have also been included. It is hoped that the bulletin will prove helpful to swine raisers and that it will assist in the direction of better and more profitable hog production in Alberta.

SWINE PRODUCTION IN ALBERTA

BY

R. D. SINCLAIR

Professor of Animal Husbandry

Since the earliest homesteading days pig raising has constituted a worth-while phase of Alberta's agriculture. Those whose occupation of Alberta's lands preceded the development of established markets found the pig a good source of food supply, and a means of converting unmarketable grains into a commodity that had a cash value. We find the pig playing much the same role after approximately forty years of agricultural evolution in this Province, only in the interval the annual revenue from pig sales has risen from a few thousand dollars to several millions. In addition to supplying a very high class meat product for farm consumption at any season of the year, the pig is a second-to-none converter of farm grown grains of low, as well as high grade into a concentrated, relatively low freight rate commodity. In times of high grain prices the value of the pig in the farm economy is not usually appreciated, but when prices decline or when grades are lowered as a result of frost or other damage, the value of this class of livestock is markedly brought to the fore. As will be indicated in the discussion which follows, the Alberta farmer who has kept pigs year in and year out, either as a very minor side line, or as a major part of his farm enterprise, has little reason to be discouraged with the results in terms of financial returns.

During the ten years from 1927 to 1936 approximately 8,126,000 hogs were delivered to Stockyards and packing plants in Alberta, and the value of these hogs amounted to approximately $120,000,000.00. The average annual revenue from hogs in this Province is therefore in the neighborhood of $12,000,000, a sum which is significant in connection with farm buying power.

It is of interest to note Alberta's position in relation to the other Provinces of Canada in the matter of swine population. According to the most recent statistics available, the various Provinces rank as follows in the matter of swine population:

Table I.—Estimated Number and Value of Swine in Canada, 1935.

Province.	Number.	Value.
Ontario	1,225,300	$14,887,000
Alberta	809,100	8,140,000
Quebec	551,400	8,557,000
Saskatchewan	514,400	5,478,000
Manitoba	183,500	2,004,000
New Brunswick	79,200	1,157,000
British Columbia	48,500	566,000
Nova Scotia	39,700	521,000
Prince Edward Island	38,300	468,000
Total Canada	3,549,200	$41,778,000

It will be observed that in 1935 Alberta stood second among the Provinces of Canada in the matter of pig population, only being exceeded by the Province of Ontario. This status is significant in that it suggests that Alberta pig producers have an important responsibility as contributors to Canada's pork supply for home or export consumption. The volume of live hogs originating in this Province must materially affect the quality of Canadian pork products and it, therefore, behooves the Alberta producer to pay careful attention to improvement in quality.

In connection with the swine population in Canada, it will be of interest to observe what has taken place during the past ten years. In order to show the fluctuation in pig population during the past decade, the total swine population for Canada, together with the population for Alberta, is shown in the following table:

Table II.—Total Swine in Canada and Alberta, 1926-1935.

Year	Total Swine in Canada	Swine in Alberta	Value of Swine in in Canada
1926	4,359,582	778,699	$69,702,000
1927	4,694,789	742,671	65,116,000
1928	4,497,367	680,000	66,595,000
1929	4,381,725	770,223	71,111,000
1930	4,000,000	636,400	58,852,000
1931	4,761,720	1,062,908	32,773,000
1932	4,639,100	1,118,000	21,964,000
1933	3,800,700	954,000	33,804,000
1934	3,654,000	896,100	36,029,000
1935	3,549,200	809,100	41,778,000

The swine population of Canada has averaged around four million head during the past ten years. The tendency has been in the direction of a decrease in population during this period. It is to be observed that there is a noticeable tendency toward rather marked fluctuation from year to year; in certain years the difference amounts to as much as 800,000

head. The variation in production of pork may amount to 80,000,000 pounds per year, a condition which must be considered when price stabilization is under review.

What has been said with regard to the fluctuation in the number of swine in Canada as a whole applies to the Province of Alberta. The departures from the average is, if anything, more noticeable in Alberta than in all Canada. The increase in 1931 as compared with 1930 is the most striking feature of the Alberta figures. This increase in the Alberta swine population was of course due to the very favorable relationship existing between hog and grain prices in 1930. The enhancement of grain values through hog feeding in 1930 led to a very material increase in the number of sows bred in the fall of 1930. The large increase was maintained in 1932, but the low prices of 1933 led to a decrease in the following year.

Is Hog Raising in Alberta Profitable?

It will be appropriate, early in the discussion of swine production problems in Alberta, to consider whether or not the pig business in this Province is on a sound economic footing. Our interest in what will follow, and in fact our interest in pig raising generally, in terms of a long time programme, may hinge on that point. A review of what has taken place in the years which have passed will prove valuable in this connection and may point the way to what may be expected to happen in the years that lie ahead.

In considering the economic status of the hog business it seems necessary to attempt to relate the cost of production to the selling price over a period of years and thereby show the number of years when hogs have been good property and the number of years when they could be considered a liability. We have chosen to consider the years 1918 to 1936 inclusive, a nineteen year period which includes the last year of the great war, the post war years and the years which have followed those of abnormal grain and livestock prices. It would appear that this period covers a sufficient variety of conditions to yield a result which should prove a valuable guide as to future prospects.

Two main factors enter into the cost of producing hogs. In the first place, overhead cost must be considered and in the second place the feed cost is an important item. At the University of Alberta, in an attempt to arrive at the cost of production of 100 pounds live weight of hogs, we have estimated in as practical a manner as possible the overhead cost of producing pork. We have taken four sows as an average farm unit and have calculated on the basis of seven pigs

raised per litter with all sows farrowing in the spring and two farrowing again in the fall, or, in other words, six litters of seven pigs or forty-two pigs marketed during the year. Charging interest at six per cent. on the money invested in breeding stock, buildings and equipment, and on the value of the land used for pasture, allowing for a ten per cent. depreciation on buildings and equipment, charging pasture on the basis of cost of seeding and providing for a $3.00 labor return per pig, as well as fair compensation for delivery of pigs to market, we estimated the overhead cost in hog production at approximately $3.25 per 100 pounds for the year 1918 to 1930 inclusive. On the basis of depreciation in values which took place during 1931 and a smaller labor return, the overhead cost for that and subsequent years was scaled down to $2.15 per 100 pounds. Adding to this figure the cost of the grain required to make 100 pounds increase in live weight, a fair working basis for arriving at the total cost of production is secured.

From the results of numerous experiments with pigs under various conditions, we conclude that a figure of 450 pounds of grain or its equivalent for 100 pounds gain in weight is one that will meet average conditions. While it is true that there are many farms, especially those where cows are being milked, where the feed required will be considerably below 450 lbs., it must be remembered that there are many farms where on account of lack of proper supplements, the figure will run much higher, and on the whole the 450 pound figure will not be far wide of the mark. If the monthly average cash grain price of oats and barley, feeding half and half, is charged to the 450 pound figure, and the overhead figure of $3.25 or $2.15 is added to this, we arrive at the monthly average cost of producing hogs. When this figure is related to the average monthly price of the basic grade of hogs, we can study the cost of production in relation to selling price.

The chart which is shown in Fig. 1 sets out the average monthly cost of production from January, 1918, to December, 1936, together with the average monthly selling price of hogs on the Edmonton Stockyards. In connection with production costs, grain was charged at Edmonton cash grain prices for 2 C.W. oats and 3 C.W. barley. Hog prices are based on the "thick smooth" grade for the years 1922-29, and on the "bacon" grade from 1930 to 1936. Premium for selects has not been included.

A study of the chart will show:

(1) The average price of the basic grade of hogs on the Edmonton Stockyards over the nineteen year period from 1918 to 1936 was $10.40 per 100 lbs.

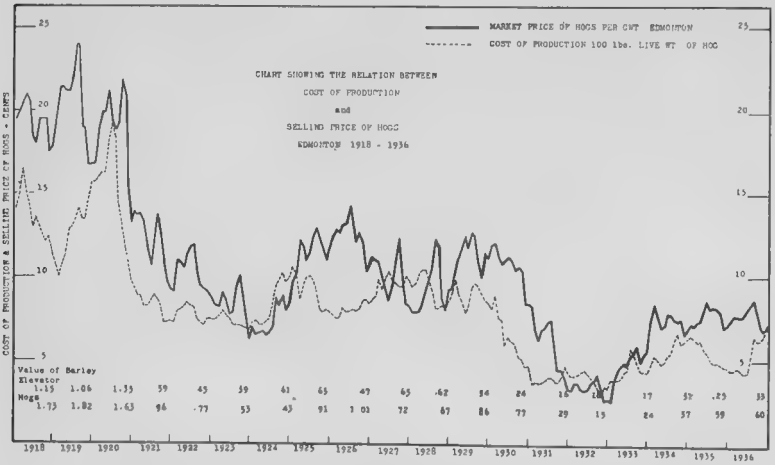

MARKET PRICE OF HOGS PER CWT EDMONTON
COST OF PRODUCTION 100 lbs. LIVE WT OF HOG
CHART SHOWING THE RELATION BETWEEN
COST OF PRODUCTION
and
SELLING PRICE OF HOGS
EDMONTON 1918 - 1936
COST OF PRODUCTION & SELLING PRICE OF HOGS - CENTS
Value of Barley
Elevator
Hogs
1918 1919 1920 1921 1922 1923 1924 1925 1926 1927 1928 1929 1930 1931 1932 1933 1934 1935 1936

Fig. 1—Chart showing relation between cost of production and selling price of hogs—Edmonton, 1918-1936.

(2) The average monthly cost of production of 100 pounds live weight of hogs over the same period was $7.45 per 100 lbs.

(3) During this nineteen year period pigs paid all overhead costs, including interest on breeding stock, buildings and equipment, took care of depreciation, paid a labor return and marketing charges, and provided for a margin of approximately $3.00 per 100 lbs. between cost of production and selling price.

(4) The average monthly Edmonton cash grain price of 3 C.W. barley was 53c per bushel, whereas this grain was marketed through hogs at 83c per bushel. The barley was increased in value 57 per cent. and the oats in similar proportion by marketing as pork instead of as grain.

(5) During seven years out of the nineteen the cost of hog production has exceeded the selling price. With the exception of 1924, however, there was no year when this situation prevailed throughout the whole year. In 1927, '28, '31, '32, '33 and '36, the other "loss" years, during certain months of the year a profitable price level obtained.

(6) Periods of high and low prices follow one another in a fairly definite order. This appears to result from a low price period discouraging production with a consequent decrease in marketings resulting in another price increase.

On the basis of the findings of the study just outlined, it would appear that one may safely state that the swine business in Alberta has been on a sound economic footing. No business

can be judged on one year's operations, and there are few enterprises that do not show occasional "loss" years. The Alberta farmer who makes pig raising a part of his regular farming programme over a period of years will find the business profitable rather than unprofitable. The individual who attempts to run pigs on the "in and out" plan is very apt to find the results disappointing as he is likely to be in when he should be out and out when he should be in. The "in and out" policy disturbs the marketing situation and gives rise to a condition of instability that is detrimental to the man who is a regular producer. The man who keeps pigs regularly, slightly raising or lowering the number of brood sows as changes in the market may be foreseen, is the one who contributes to permanency in the pig business, and is the one who has a class of stock on hand which can satisfactorily utilize grain which may have depreciated in quality as a result of some adverse condition. In the latter regard our experiments of recent years have indicated that feed wheat can be satisfactorily utilized by pigs, and in 1929 with hogs selling around the ten-cent mark, feed wheat was marketed through the "hog route" at as high as $1.96 per bushel. In connection with the study just reviewed, it would be safe to state that the man who had dairy by-products available on the farm and has received a premium for the highest grade of market hog has had few "loss" experiences.

Seasonable Variations in Marketing

An occurrence which affects the business of processing hogs in Alberta and indirectly affects the returns to the producer is the irregularity of the supply of pigs being marketed month by month. A glance at the chart shown in Fig. 2 will convey some idea of the number of hogs marketed monthly at the Calgary and Edmonton Stockyards, based on an average covering the ten year period from 1926 to 1935. It will be noted that a much larger number of hogs are marketed during the fall and early winter months than during the spring and early summer months. It would appear that spring farrowed pigs being marketed during the months of November, December and January constitute a large bulk of the year's receipts. Fall farrowings being marketed during the months of April, May and June form a much smaller bulk. During the ten-year period under review some 603,000 pigs were marketed during November, December and January, as compared with approximately 489,000 marketed during the months of April, May and June.

When the line on the chart indicating the number of hogs reaching the markets is compared with the line indicating the average monthly prices during the same period, it will be seen that quite marked variations occur in the prices paid during the various months. When the heavy marketings com-

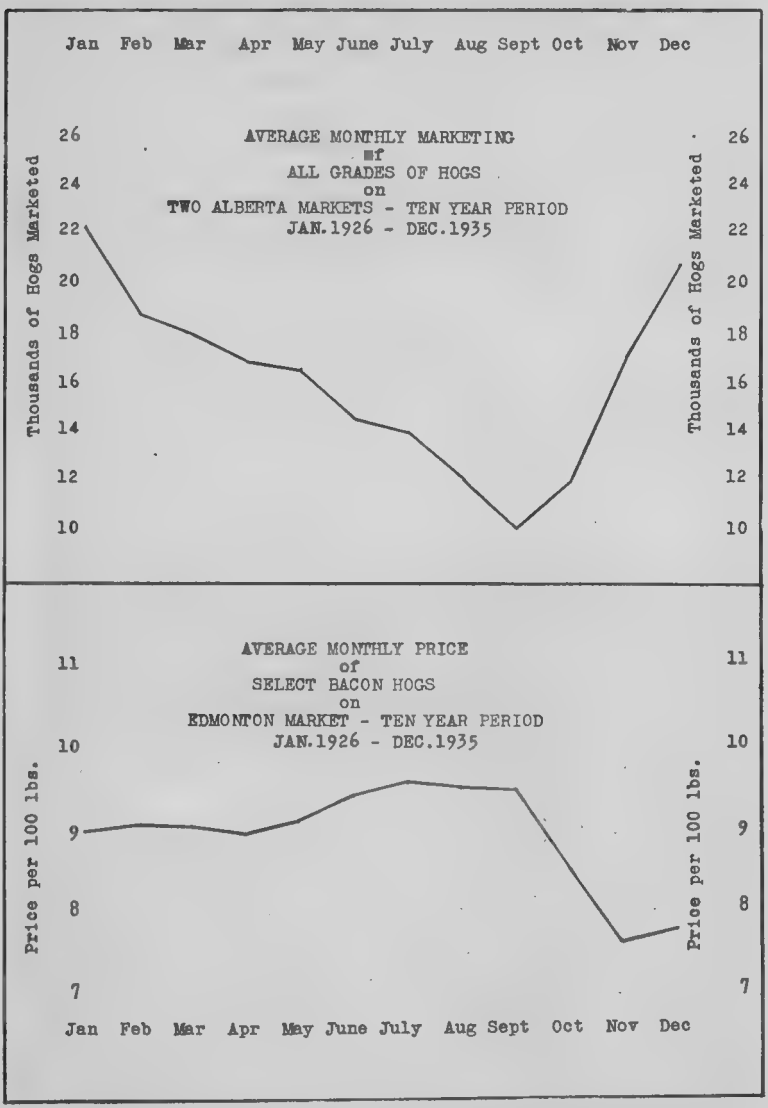


Fig. 2—Chart showing relation between monthly receipts and market prices. Edmonton market. Ten year period, 1926-1935.

mence in October, the prices commence to decline and the downward trend continues until receipts diminish early in the year. With gradually lessening receipts, the price gradually strengthens during the spring and early summer, reaching a high point in August and September.

It would seem logical to conclude that a more equitable distribution of marketings throughout the various months of the year would tend to bring about a more even price level throughout the year, and at the same time a higher average price for the twelve-month period. A more general adoption of the practice of producing two litters per year instead of only one would tend to increase the receipts during the spring and early summer months and contribute much to stabilization of receipts and prices. The possibilities of the "two litter per year" scheme will be discussed in some detail in a later section of this publication.

Our Market Outlet

A matter of immediate concern in connection with the production of any class of livestock is that of available markets for the product.

The Canadian market is, if course, our best outlet for pork and pork products, absorbing in 1934 some 718,998,477 pounds, or 66.36 pounds per person. The Canadian population is, however, not large enough to absorb the annual pig crop of the country, and as a result we are in the position of being an export country. Since the quality of pork which must be disposed of outside of the country has an important bearing on the price paid in Canada, we are in the position of having to study available export markets very carefully. Being an exporting country we are in the position of facing competition with all countries in the world that produce more pork than is required for domestic consumption, and there are many countries in this position.

While we, in Canada, are situated in close proximity to a great consuming nation, the United States, they too produce more pork than they require, and like ourselves are an exporter of pig products. That means that they do not need our pigs and pork, and accordingly raise a tariff wall against them. We must, therefore, look to a country which is a regular importer of pork products on a generous scale, if we are to establish a steady market for our pork. In this connection Great Britain stands as our most attractive market. Great Britain must import vast quantities of meat annually to meet the needs of her population. Under present conditions the British pig producer supplies about 20 per cent. of the coun-

try's bacon requirements. While the Pig Marketing Scheme now in effect, giving as it does more security to the home producer in his own market, is encouraging greater home production, it will undoubtedly take some time to materially reduce the imports from Empire and foreign countries. In any event, the quota of 280,000,000 lbs. of good quality bacon granted to Canada under the terms of the Ottawa Conference and renewed by the Anglo-Canadian Trade Agreement of 1937, places us in a favorable position in the matter of our relation to this valuable market. It would seem reasonably clear that the British market is the outlet for Canadian bacon which is likely to be permanent and the one upon which we should focus our attention.

In order to convey some idea of the proportions of the British market and of the number of countries which are making an attempt to gain a foothold on that market, the following table showing Britain's sources of bacon supply in 1936 is presented:

Table III.—Britain's Bacon Imports, 1936

Country	Pounds Bacon	Percent of Total
Irish Free State	56,578,144	7.69
Canada	122,348.912	16.63
Australia	46,368	.....
Other Empire Countries	484	.....
Denmark	377,822,408	51,35
Poland	45,742,480	6.22
Netherlands	54,287,296	7.38
Sweden	27,059,648	3.68
Lithuania	21,675,696	2.95
Estonia	4,835,600	.66
Latvia	4,072,922	.55
Soviet Union (Russia)	4,674,320	.64
Finland	2,342,164	.32
Germany	224	.....
Norway	1,286,880	.17
Hungary	1,326,416	.18
Belgium	1,097,600	.15
Czecho-Slovakia	73,024	.....
Yugo Slavia	2,330,160	.32
Austria	224	.....
Romania	1,306,704	.18
Switzerland	184,352	.03
France	65,072	.....
Bulgaria	1,112,496	.15
United States	1,896,720	.26
Argentina	2,978,448	.40
Brazil	661,360	.09
Other Foreign Countries	2,352	.....
Total Empire	178,974,208	24.32
Total Foreign	556,824,688	75.68
Total all countries	735,798,896	100.00

It will be gathered from the above table that Great Britain imported over three quarters of a billion pounds of bacon in 1936. In addition, hams, to the extent of 75,000,000 pounds, were imported as well as a considerable volume of fresh and frozen pork. The number of countries contributing to Britain's bacon supply suggests that all countries consider this market a valuable one. Competition is extremely keen, and as a result quality stands out as a matter of prime importance.

Canada in Relation to Other Countries in the British Market

The chart shown in Fig. 3 will convey a more vivid impression of Canada's position on the British market during recent years than can be suggested by the use of figures. This chart shows the percentages of bacon imported into Great Britain from various countries for the twenty-five-year period from 1912 to 1936.

It will be noted that the United States figured very prominently in Britain's bacon supply during the years of the Great War, but since that time there has been a gradual reduction in volume of imports from that country, and at the present time American bacon is practically an unknown quantity on the British market.

Denmark's position on the British market calls for special consideration. It will be seen that in 1912 Great Britain obtained 50 per cent. of her bacon supplies from Denmark. During the war years Danish bacon practically disappeared from British shops, the shipping blocade on the North Sea practically prohibiting the importation of feeds to that country and the shipment of bacon from it. The rehabilitation of the pig industry in Denmark since the close of the war and her present strong position on the British market constitutes one of the most remarkable agricultural achievements of modern times. It is not to be wondered at that all pig producing countries have been carefully studying Danish policies and practices in swine production.

Exports of Canadian bacon to Britain have followed an erratic course during the twenty-four year period. In 1912 Canada supplied 12% of Britain's requirements, increasing to 26.9% in 1917 and holding that position from 1916 to 1920. From 1920 to 1926 annual shipments of around 100,000,000 pounds went forward to Britain. Following 1925 the volume decreased for a number of years, reaching a low point in 1931, when only 5,500,000 lbs. were sent. Since 1931 the trend has been upward, reaching a total of 122,000,000 pounds in 1936. If Canada is going to produce more hogs than are required for home consumption the aim should be a steady

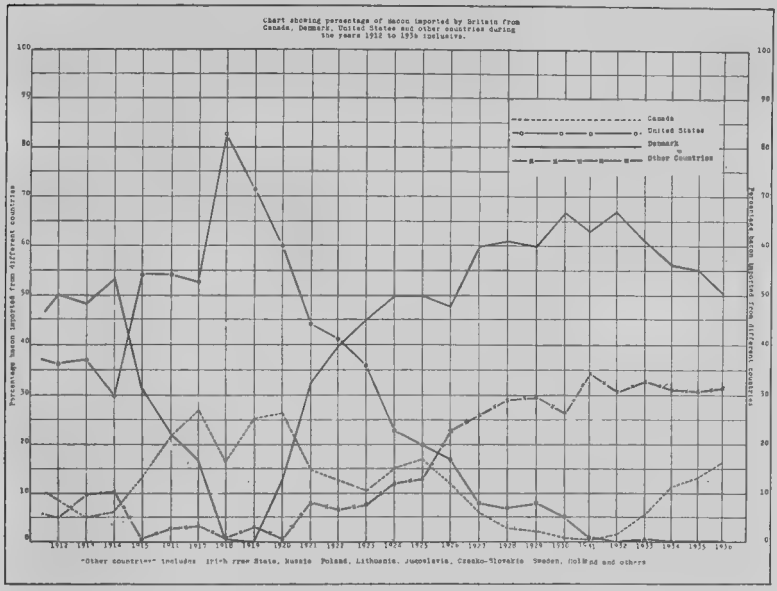


Chart showing percentage of Bacon imported by Britain from Canada, Denmark, United States and other countries during the years 1912 to 1936 inclusive.
Canada
United States
Denmark
Other Countries
Percentage bacon imported from different countries
"Other countries" includes Irish Free State, Russia, Poland, Lithuania, Jugoslavia, Czecho-Slovakia, Sweden, Holland and others

Fig. 3—Chart showing Percentage of Bacon imported by Britain from different countries, 1912-1936.

increase in high quality production until she is in a position to take full advantage of the 2½ million hundredweight quota of bacon agreed upon at the Ottawa Conference.

The line on the chart indicating "other countries" is of interest. Here are included such countries as the Irish Free State, the various Baltic states, Russia, Sweden and the Netherlands. These countries are gradually assuming a more prominent position on the British market. "Irish" bacon, of course, has always been highly regarded, but shipments from the Irish Free State have not been heavy during recent years. Sweden and the Baltic states have increased exports to a remarkable extent of recent years, and it is worth bearing in mind that extensive importations of bacon breeding stock from Britain during the past decade, together with a considerable measure of Government control, have made for a great improvement in quality.

Referring again to Denmark's success on the British bacon market, it may be mentioned that the main keynotes in her achievement are uniformly high quality, together with volume and continuity of supply. High quality Danish bacon is to be had throughout Britain in any quantity at all seasons of the year. The lesson for Canada is plain. If we are to

improve our position on the world's greatest pork market we must work toward an increase in volume of a high quality product and produce consistently year in and year out. After making first hand observations in Denmark in the summer of 1931, the writer is of the opinion that apart from proximity to Britain, Denmark has no particular natural advantages over Canada in the matter of bacon hog production. With regard to feed supply (apart from dairy by-products) and climate, Canada has the upper hand. More uniformity in type of pig and in feeding and management methods are features to which we must give careful consideration.

The Type of Pig to Be Raised

Having reached the conclusion that the British market is the market which Canadian swine producers must cultivate, it is in order now to consider the requirements of that market, as this feature has an important bearing on the type of hog which must be produced in this country. It may be stated that the highest prices are paid on the British market for lean pork products. Fat pork sells at a discount as compared with the lean, whether it be fresh, frozen, or cured. The greater bulk of the pork which is imported into Great Britain is received in the form of Wiltshire sides, and the highest selling Wiltshires are those showing a high proportion of lean to fat, good length of side and superior quality throughout.

A Wiltshire Side

Such a considerable amount of confusion exists in the minds of hog producers as to what the term "Wiltshire" means, a word of explanation may be in order. The term Wiltshire, unlike Berkshire or Yorkshire, does not refer to a breed of pig but to a particular style of dressing the hog carcass. A Wiltshire side is one-half the carcass of a pig with the head, feet, leaf lard, tenderloin, neck bone, tailbone, and minor trimmings removed. These Wiltshire sides such as are shown in the illustration on page 20 are packed in bales or boxes and shipped to Great Britain by practically all exporting countries. Whether hanging on Smithfield Market in London, or in the shops throughout Britain, these sides when properly cured and smoked constitute an attractive article, and the main interest in pork buying centres around this product.

Requirements of a Choice Wiltshire

In order to bring the highest price on the British market, Wiltshire sides must possess certain characteristics, among them being:

(1) Uniform weights averaging around 55 to 65 pounds.
(2) Good length from the first rib to the hip bone, since this is the highest priced portion of the side.
(3) Shoulders light, as the shoulder cuts are low priced.
(4) Ham, trim but well developed and carried with meat down to the hock.
(5) Evidences of a high percentage of lean as indicated by lack of any excess fat. An even covering of fat from 1¼ to 1½ inches along the back is most desirable.
(6) Belly thick, as indicated by fullness and firmness in region of the flank.

Type of Pig to Produce High Class Wiltshires

It would seem quite clear that if our aim is to export our surplus pork in the form of superior Wiltshire sides, in competition with a high class product from such countries as the Irish Free State and Denmark, our aim should be the production of a type of pig similar to that produced in those countries. Such pigs are of the bacon type, and having an appreciation of what is required in the most desirable Wiltshire sides, we can readily grasp what must be the most significant feature in connection with the bacon type of pig.

In general type, bacon hogs are slightly long of leg, a feature which gives them a style and alertness not found in pigs of the old lard, or butcher type. The bone must be strong and clean and the pig must stand well up on its pasterns. Length of side is a feature of prime importance, and this length is estimated from just behind the shoulder to the hip joint. The shoulder must be smooth, showing no tendency to bulge on the side; an even arch of back from neck to tail indicates uniformity of fleshing, and an evenness of width throughout the body suggests good development of back, loin and ham in relation to shoulder. The bacon hog should show fair depth of body in order to insure good feeding qualities. Constitution is indicated by width between the eyes, and between the forelegs, and lack of over refinement of bone. Freedom from excess fat at the jowl, underline, and ham facings insures a leanness of carcass and freedom from waste which is highly desirable. Bacon hogs of this type killed at weights of from 200 to 210 pounds produce Wiltshire sides of acceptable quality and weight. Hogs of this type are economical feeders, and are admirably adapted to make use of the kind of cereals which are raised on the farms of Alberta. Experimental evidence is at hand to show that pigs of correct bacon type grow as well and do not require any more feed than pigs of a thicker type.

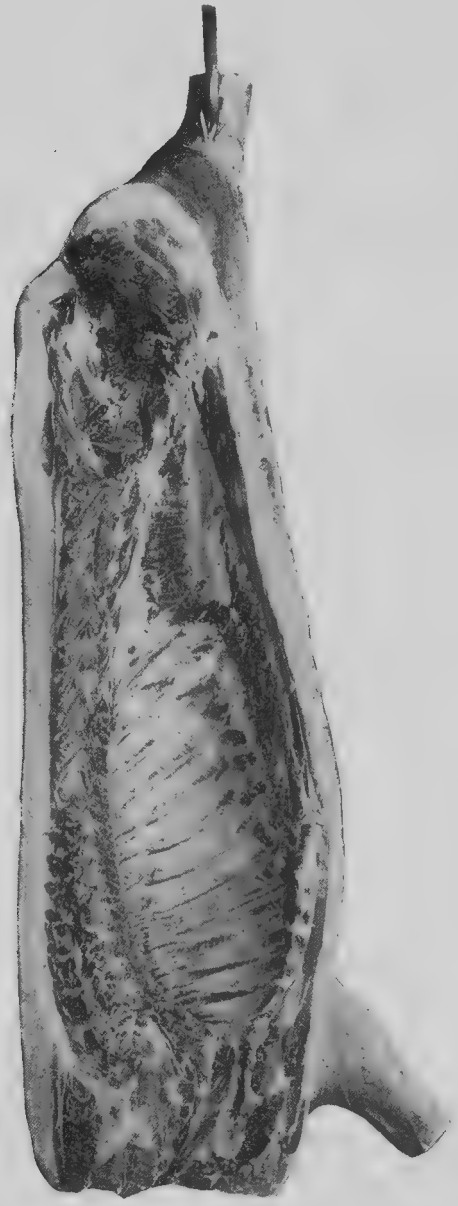


Fig. 4—Wiltshire Side. Note the length from hip bone to first rib and the uniform depth of back fat.

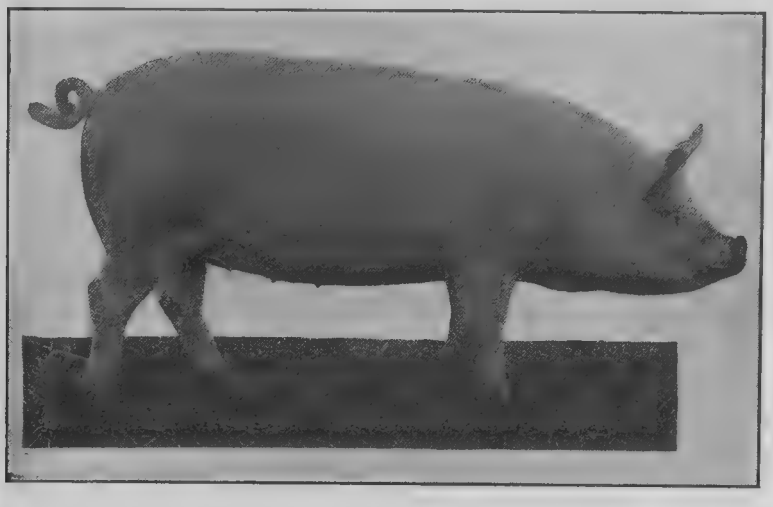


Fig. 5.—A pig of select bacon type. Note the long side, deep flank, strong loin and full, trim ham. Pigs of this type are economical feeders and produce Wiltshire sides which meet the requirements of a discriminating market.

Bacon Type Breeding Stock

If market hogs of the proper type are to be produced, the breeding stock must show the characteristics desired in the offspring to be sold. The type of pigs marketed will depend very largely on the class of sow kept and the type of boar to which she is mated. Whether pure-bred or grade, a sow should be selected out of a litter of good size and preferably from a sow of good disposition and possessing good milking qualities. Bacon type sows must show plenty of length of side and at the same time sufficient depth of body to insure good feeding and breeding capacity. Strength of constitution should not be sacrificed for length. Young bacon type sows should show good fleshing qualities of back, loin and ham, and must stand straight in the pasterns. Sows that are "bare on top" are apt to produce late finishing pigs. A good sow should possess from ten to twelve, or better still, fourteen teats, as mammary development will be a main limiting factor in the production of large litters. The sow should be feminine in appearance and free from any tendency toward coarseness and "stagginess."

A pure-bred boar should always be used, and in selecting a boar the type of sows to which he is to be mated should be given careful consideration. If the sows show exceptional

Fig. 6.—A purebred boar should always be used. This Yorkshire boar in use at the University Farm shows good length with strength of constitution.

length and a tendency toward lack of constitution, a boar of moderate length but possessing a strong constitution should be used. Likewise, if the sows lack length, this feature should be a dominant characteristic of the boar selected. In the main, the bacon type boar should be masculine, should show a ruggedness of bone, without coarseness, good length with strength of constitution, together with strength of top and smoothness and evenness throughout. It should be borne in mind that boars of the proper type are a very important factor in improving the quality of commercial pigs, since a good breeding boar may be mated to a large number of sows, and for that reason great care should be taken in the selection of this member of the herd.

The Bacon Type Breeds

While the matter of type is probably of greater importance than the breed in the selection of breeding stock, yet it is well to consider the merits of the various breeds so that an intelligent selection may be made. A good many breeds of American and European origin have made their appearance in Alberta, but it is generally recognized that only breeds which are likely to produce a high percentage of pigs of correct bacon type are the Yorkshires, Tamworths and Canadian-type Berkshire. While a certain number of pigs of select bacon type may be secured from such breeds as the Duroc-Jersey, Poland-China, Chester White and Hampshire, they

too often lack the length and quality of finish necessary to yield high class Wiltshire sides. These breeds were developed under conditions where bacon producing feeds were not dominant and lean pork was not demanded, and it is not to their discredit that they do not fit well into the bacon scheme.

The Yorkshire

The Yorkshire breed is generally recognized as the premier bacon breed, and is extensively used in all countries where the aim is bacon production. In such countries as the Irish Free State, Denmark, Holland and England (where the breed originated), the majority of the pigs being slaughtered show the influence of Yorkshire blood. In Eastern Canada the Yorkshire has long been a popular breed, but only since the Dominion Government's hog grading policy was introduced in 1922 has the Yorkshire been extensively used in Alberta.

Fig. 7.—Champion Yorkshire sow, English Royal Show, 1932.

Since the general introduction of Yorkshire boars following that date, a marked improvement in the quality of the pigs being marketed has been noted.

The Yorkshire is a pure white breed, black hair and skin spots being objectionable. The breed is noted for its size, mature boars weighing from 700 to 800 pounds and mature sows from 600 to 700 pounds. Length of body is a prominent characteristic of the breed. Yorkshire sows are generally very prolific, and as a rule have the necessary mammary

development to nurse large litters. Certain strains of Yorkshires tend to lack somewhat in constitution and feeding qualities, and a susceptibility to sunscald under certain conditions has made the breed unpopular on some Alberta farms. When Yorkshires possessing not only length of body but strength of constitution as well are selected, and simple though definite precautions are taken to prevent sunscalding, there appears to be no doubt that this breed provides the surest means of attaining the production of a high percentage of select bacon hogs.

The Tamworth

The Tamworth is one of the oldest breeds of pigs, and has been noted from the beginning as a producer of superior quality bacon. A golden red is the typical color; black skin and hair spots should be eliminated. As a breed, the Tamworth is scarcely as large as the Yorkshire, although boars will weigh from 600 to 700 pounds and sows from 500 to 600 pounds when mature.

Fig. 8—Champion Tamworth sow. English Royal Show, 1932.

Tamworth pigs show good depth of side, but as compared with the Yorkshires lack somewhat in length of side and tend to be light in the hindquarters. On the whole, however, the Tamworth seems to possess superior fleshing of back and loin, and it is rare for pigs of this breed to lack the necessary finish at weights from 200 to 210 pounds.

Tamworth sows, as a rule, are not as prolific as Yorkshires, and young sows especially are inclined to give rather small litters. Improvement in prolificacy is a requirement of the breed at the present time. The following table shows the relative size of litters of the three breeds under discussion. The figures presented are compiled from our farrowing records at the University of Alberta for the years 1922 to 1936 inclusive:

Table IV.—Average Size of Litters of Various Breeds

	No. of Farrowings.	Total Pigs Farrowed.	Av. Size of Litter.
Yorkshire	318	3,379	10.6
Tamworth	464	4,139	8.9
Berkshire	169	1,404	8.3

The swine raiser who is aiming to produce hogs of the bacon type and who objects to the white color may well select the Tamworth as a breed with many splendid qualities. In selecting pigs of this breed, length as well as development of hindquarters should be kept well in mind.

The Berkshire

The Berkshire has never been recognized as a bacon breed, but what is known as the Canadian type Berkshire has been developed along bacon lines. Certain breeders have developed a type which shows sufficient length to qualify for the select bacon grade, but the black color is a limiting factor in the use of this breed for purposes of bacon production in view of the objectionable skin color and the tendency toward the production of "seedy" bacon. Berkshire sows may be crossed with Yorkshire boars, producing a white pig of acceptable type.

Fig. 9—Grand Champion Berkshire sow, at Royal Winter Fair, Toronto, 1929. Owned by P. J. McEwen, Wyoming, Ont.

Cross-breeding

Cross-breeding, or the mating of pure-bred sows and boars of different breeds, is a practice which is followed with good results in many instances. In connection with this practice it is significant that the majority of the pigs marketed in Denmark are cross-bred. By crossing two breeds a slight increase in vigor may be secured, but what is of more importance, the desirable qualities of the two pure-breds may be combined in the cross-bred commercial animal.

At the University of Alberta good results have been secured by crossing the Yorkshire and Tamworth breeds. By way of indicating the principle of cross-breeding, it may be stated that when Tamworth sows are mated to a Yorkshire boar the resulting pigs show more length than Tamworths, superior covering of back and loin than the average Yorkshire, and a general trimness that appears to combine the better tendencies of both breeds. Yorkshire boars when mated to sows of practically any breed produce vigorous growing pigs of a much improved type.

When cross-breeding of swine is intelligently practised, and the resulting stock is disposed of commercially, it offers a means of producing a superior grade of market animal.

Swine Improvement Policies

In an endeavour to standardize the type of hogs reaching Canadian markets and to encourage the general production of pigs conforming to the bacon type, certain Federal and Provincial Government Swine policies have been put into effect. Such policies are common to all countries concerned with catering to an exacting export market, and it should be borne in mind by Alberta swine producers that practically all European countries supplying the British market exercise very rigid government control over the swine industry. Such control is considered absolutely necessary if a standardized, high-grade article is to be secured. The view is held that any breed, breeding method, or feeding method which is detrimental to the general uniformity of the export product, must be eliminated for the common good.

Live Hog Grading

Chief among the policies having as their object the improving of the quality and standardizing the weights of Canadian hogs may be mentioned the Dominion Government Hog Grading Policy. This scheme, which was put into effect in 1922, has as its object the grading by an official Govern-

ment grader of all hogs offered for sale at Canadian stockyards and packing plants, and the payment of a premium for pigs of the type and quality suitable for the production of the highest grade of export bacon. Space will not permit of detailed discussion of this policy, but those desiring full information on the scheme are referred to the "Handbook on the Bacon Hog and Hog Grading," which may be obtained from The Livestock Branch, Department of Agriculture, Ottawa. It will suffice to say here that the grading of hogs and the present premium of 50 cents per 100 pounds which is paid by the packers for "select bacon hogs" over the basic grade of "bacons" are influences which are steadily working toward an improvement in the type of pigs throughout Canada.

The grades of live hogs which are officially recognized by the Government hog graders and as are set out under the Hog Grading Policy are as follows:

Grade 1.—Select Bacon: Hogs weighing 180 to 220 pounds W.O.C. at stockyards and abattoirs or hogs weighing 190 to 230 pounds fed and watered at stockyards or at local shipping points and at such other points as may be designated from time to time; jowl and shoulder light and smooth; back from neck to tail evenly fleshed, side long, dropping straight from back, belly showing thickness of fleshing; flank well let down and firm; ham full; good general finish; no excess fat.

Grade 2.—Bacon: Hogs weighing 170 to 220 pounds W.O.C. at stockyards and abattoirs or hogs weighing 180 to 230 pounds fed and watered at stockyards or at local shipping points and at such other points as may be designated from time to time; of the same general characteristics as select bacon hogs, but lacking somewhat in length and/or in general quality as compared with the select bacon grade; good general finish; no excess fat.

Grade 3.—Butchers: Hogs weighing 150 to 230 pounds W.O.C. at stockyards and abattoirs or hogs weighing 160 to 240 pounds fed and watered at stockyards or at local shipping points and at such other points as may be designated from time to time; not conforming to the standards for the bacon grades, smooth fleshing and good finish.

Grade 4.—Heavies; Hogs weighing over 230 pounds and up to 260 pounds W.O.C. at stockyards and abattoirs or hogs weighing over 240 pounds and up to 270 pounds fed and watered at stockyards or at local shipping points and at such other points as may be designated from time to time; hogs of smooth conformation and finish.

Grade 5.—Extra Heavies: Hogs weighing over 260 pounds W.O.C. at stockyards and abattoirs or hogs weighing over 270 pounds fed and watered at stockyards or at local shipping points and at such other points as may be designated from time to time; of smooth conformation and finish.

Grade 6.—Lights and Feeders: Hogs of smooth conformation under 150 pounds W.O.C. at stockyards and abattoirs or hogs weighing under 160 pounds fed and watered at stockyards or at local shipping points and at such other points as may be designated from time to time, and unfinished hogs of any weight.

Grade 7.—Roughs: Hogs of rough conformation, any weight.

Grade 8.—Sows: All females that have raised one or more litters.

Sub-grade.—(a) Those of smooth finish and trim underline weighing up to 350 pounds W.O.C. at stockyards and abattoirs or sows weighing up to 360 pounds fed and watered at stockyards and abattoirs and at local shipping points and at such other points as may be designated from time to time.

Sub-grade.—(b) All other sows.

Grade 9.—Stags: Boars which have been castrated and are well healed.

In order to show the present status of Alberta hogs as compared with those produced in the Province of Ontario and the average for Canada, the following table showing the grade for 1936 is shown:

Table V.—Hog Grades by Percentages, 1936
Alberta and Ontario Compared with Total for Canada

Grade.	Percentages. Alberta.	Ontario.	All Canada.
Select Bacon	22.62	31.61	24.44
Bacon	38.75	49.92	42.19
Butchers	25.52	9.25	17.00
Heavies	2.26	2.15	2.57
Extra Heavies	0.60	0.46	0.95
Lights and Feeders	5.98	3.76	8.63
No. 1 Sows	1.68	0.43	1.71
No. 2 Sows	2.28	2.16	2.18
Roughs	0.17	0.14	0.19
Stags	0.14	0.12	0.14

It will be noted from the above table that slightly better than 27% of the hogs marketed in Canada in 1936 reached the top grade of "select bacon" and approximately 67% reached the two top grades. It will be observed that in the Province of Ontario, where the bacon type of hog has been established for a great many years, pigs of the "select bacon" and "bacon" grade made up approximately 80% of the marketings. In Alberta 61% of the pigs made these grades. When it is recalled that in 1922 when hog grading commenced, only 2% of the pigs marketed in Alberta graded "select bacon", it is realized that substantial progress has been made. At the same time, there is still plenty of room for improvement. Careful selection of breeding stock of the proper type, and the application of the proper feeding and management methods must be kept in mind at all times in connection with pig raising in Alberta.

Carcass Grading

In addition to the grading of live hogs, the Dominion Livestock Branch offers an alternative grading service in the form of "rail grading" or the grading of the carcasses after slaughter. The individual producer may elect one or other of the two systems of grading.

Carcasses are graded according to their conformation and finish with the top grade designed to include those of the best export quality. Grade "A" carcasses may range from 140 to 170 lbs. in weight, must show a minimum length of 29 inches with a maximum shoulder fat of 2 inches and maximum loin fat of 1½ inches. The premium which is paid for "select bacon" hogs over those of the "bacon" grades is paid for grade "A" carcasses over those which grade "B" (Class 1). Grade "B" (Class 1) is the basic carcass grade and includes carcasses ranging in weight from 135 to 175 lbs., minimum length 28 inches, maximum fat at shoulder 2¾ inches and maximum fat at loin 2 inches. A variety of other grades, to include hogs of varying weights, type and quality, are included in the carcass grading regulations. (See leaflet, Hog Carcass Grading Regulations, Dominion Live Stock Branch, Ottawa.)

In arriving at the price to be paid for carcasses of the basic grade (B1) an average dressing percentage is used and calculating from the basic live grade (bacons) the carcass price is determined. Thus, if the average dressing percentage at a certain packing plant is determined as 74% and the live price for bacons is $8.00 per cwt., the price paid for the basic carcass grade is $10.80 per cwt. The calculation taking a 200 lb. hog is as follows: $200 \times \$8.00 = \$16.00 \div 148$ (dress wt.) $= \$10.80$ per cwt. When hogs are sold on "rail" grade (carcass grade) the seller whose hogs yield a higher dressing percentage than the average receives a higher price than the average, while the one whose hogs yield a lower dressing percentage than the average receives a lower price. In view of the fact that weight is an important factor in determining the carcass grade, the aim should be to market pigs well finished at weights not exceeding 210 pounds at the farm.

That the method of selling according to rail grade is meeting with the approval of producers is indicated by the fact that in 1934 when the plan was put into effect, 3,577 hogs were rail graded, whereas in 1935 the number increased to 115,209 and in 1936 to 447,493.

Advanced Registry for Swine

A Dominion Government Policy which is making an important contribution to swine improvement is known as the Advanced Registry Policy for Swine. This scheme seeks to identify the best producing sows and boars in pure-bred herds and puts a premium on litter size, early maturity and carcass quality. The breeder owning sows and boars qualifying under this scheme is in a position to supply superior breeding stock to commercial producers, and incidentally is entitled to a premium for stock from proven ancestry. A Pig Testing Station to facilitate the carrying out of this Policy is in operation near the City of Edmonton. Information regarding this scheme may be secured from the Dominion Livestock Branch representatives at Calgary and Edmonton.

Other Federal Swine Policies

In addition to the policies discussed, the Dominion Government has in operation a number of additional swine improvement policies. These include brood sow purchase, gilt culling, sire purchase and boar loaning schemes. Farmers interested in taking advantage of any of these forms of assisstance are advised to communicate with the Senior Fieldman, Field Services, Dominion Livestock Branch, Edmonton.

Swine Clubs

Among the agencies which have been responsible for marked improvement in the quality of Alberta hogs of recent years may be mentioned the Boys' and Girls' Swine Clubs. These clubs, which are supported by both Dominion and Provincial Governments, not only interest the young people in raising good pigs, but are centres of swine improvement which work into extensive areas. Communities interested in organizing a swine club may secure information regarding this movement from the Supervisor of Boys' and Girls' Clubs, Department of Agriculture, Edmonton.

Scale of Operations

As a general rule the pig business is subsidiary to some other branch or branches of the farm enterprise, and it would seem that the greatest returns are to be secured from pigs when they occupy this position. When only one or two sows are kept a considerable portion of the feed supply is in the nature of "odds and ends" about the farm, and the grain allowance is supplemented by a certain amount of dairy by-products or household refuse. Under such conditions the feed

bill to be charged to the pigs is not heavy and good returns can readily be calculated. It is a mistake to estimate that twenty sows will give twenty times the returns that one sow will, for when the numbers are multiplied the drain on the grain supply is heavier, and in order to compensate for the scarcity of milk and household garbage, some supplementary feeds must be purchased. At the same time, as has been pointed out previously, even when the higher grades of grain are fed and supplementary feeds are utilized, fairly large scale pig raising can be profitably carried on over a period of years. The inexperienced pig raiser will, however, be well advised to carry on in a small way until he has a chance to study the efficiency of his methods in the light of the returns which he is securing.

FEEDING AND MANAGEMENT OF SWINE

In connection with swine raising, considerable progress has been made when the correct type of breeding stock has been secured, but the ideal in market hog production will not be attained unless the best feeding and management methods are followed. Unless the breeding stock are maintained in vigorous condition and the young pigs are kept growing from the start on well balanced feeds, the "pork making machinery" is not likely to function efficiently. The aim in the pig business should be the marketing each year of a maximum number of pigs on a minimum amount of feed, or in other words, economical production.

During the past twenty years a considerable number of swine feeding experiments have been conducted at the University of Alberta. The main objects of these experiments have been to study rations, supplementary feeding, and methods of feeding with a view to determining the feed combinations and methods of feeding which will produce an acceptable type of pig at the lowest possible feed cost, and during a feeding period of minimum length. It will be the object of the discussion which follows to present to swine raisers a review of swine feeding and management problems based on the results of experiments conducted at the University of Alberta, with the hope that it may be of some service, particularly to those who may have had comparatively little previous experience with hogs.

Composition of Common Swine Feeds

Before commencing a discussion of feeding and management practices, however, it should be of interest to consider

some facts relative to the composition of common swine feeds and to draw some general comparisons between the various feeds available to Alberta swine producers.

A very good idea of the comparative value of various feeds may be secured by subjecting them to a chemical analysis. The chemist groups the various components of feeds under the following headings: water, ash, crude protein, fibre, carbohydrates and fat. The constituents of oats, for example, are grouped in this way because each of these groups play a definite and different part in connection with body up-keep and growth.

The moisture content is determined because the less moisture a feed contains the higher its feeding value, pound for pound. Cereals which are damp or tough do not return as good value for each 100 pounds fed as those of lower moisture content.

The ash contains the mineral constituents of the feed, and unless additional mineral matter is fed the ash forms the only source of supply of mineral for the animal. The ordinary farm-grown grains are very low in ash. The hays and grasses contain more ash; such hays as alfalfa and the clovers are very rich in mineral matter, especially lime. Since pigs are fed heavily on cereals, it is necessary to pay careful attention to mineral supplements.

The crude protein contains all the nitrogenous compounds, and this part of the feed is used to produce lean meat, body tissue, hair, skin, hoof, etc. The demand for protein is very heavy in young growing pigs, pregnant sows and sows nursing litters. The bacon hog, which is a producer of lean meat, requires a plentiful supply of protein rich feeds. Such feeds as skim-milk, tankage, linseed oil meal and bran are rich in protein.

The fibre is the part of the feed stuff which is of least use to the pig. Oat hulls consist largely of fibre and are to a large extent indigestible. Cattle and sheep can make considerable use of fibrous feeds because they have a large paunch and chew the cud, but the pig with its small stomach, can make little use of high fibre feeds. This is a point to be borne in mind in pig feeding.

The carbohydrates compose the starchy portion of the feed, and are largely used to supply the heat and energy required by the pig and for the production of fat in the body. Barley, wheat and corn are feeds which are rich in carbohydrates.

The term fat, when used in connection with the composition of a feed, embraces not only true fat but certain oils. The fat is used for the same purposes as the carbohydrates,

namely, heat and energy and the production of body fat. If a feed is very rich in oils, especially those of a soft nature, they may adversely influence the quality of fat in the carcass. None of the feeds commonly used in Alberta, however, is likely to cause any trouble in this respect.

A table setting out the percentage of composition of various feeds may constitute a valuable guide in arriving at relative values, and for that reason the following table is submitted. A large number of chemical analyses have been made of the common feeds and a reliable average figure has been obtained. Figures relating to the content of ash, fibre, protein, carbohydrates and fats can be studied with profit.

***Percentage Composition of Some Common Swine Feeds**

	Water.	Ash.	Total Protein.	Fibre.	Carbohydrates.	Fat.
Oats	8.9	3.6	12.0	10.6	60.2	4.7
Barley	9.6	2.9	11.8	5.7	68.0	2.0
Wheat	10.2	2.0	13.1	3.0	70.0	1.7
Rye	10.0	2.0	12.3	2.3	71.7	1.7
Corn, Dent	11.5	1.4	9.7	2.3	71.1	4.0
Shorts	10.3	2.5	16.1	2.9	65.1	3.1
Bran	9.4	6.0	15.8	9.5	54.3	5.0
Skim-milk	90.4	0.8	3.7	.....	5.0	.....
Butter-milk	90.6	0.8	3.5	.....	4.5	.....
Tankage	7.8	25.9	50.3	2.0	2.7	11.3
Linseed oil meal	9.7	5.4	35.3	8.0	36.2	6.4
Fish meal	7.5	14.7	66.7	0.7	3.6	6.8
Alfalfa hay	9.6	8.3	14.7	29.0	36.4	2.0
Potatoes	78.8	1.1	2.2	0.4	17.4	0.1
Rape pasture	83.6	2.2	2.9	2.6	8.1	0.6

*From "Feeds and Feeding," Morrison, twentieth edition.

Swine Feeds Available in Alberta

A knowledge of the comparative values of the various feeds suitable for pig feeding should be of assistance in connection with planning a cropping scheme or in getting the greatest value for money spent when feed has to be purchased. The discussion which follows, when considered in conjunction with the figures dealing with chemical composition should form a basis for evaluating the common swine feeds.

Oats.—Oats are one of the staple cereals of Alberta, and may well form a part of the ration for most classes of pigs. They may be used as part of the grain mixture for young growing pigs, brood sows, and breeding boars, but we would not recommend that they be fed as a sole grain to any class of pig unless they are the only grain available. There is a prevalent belief that good bacon hogs cannot be grown unless

oats are used as a sole grain for young pigs, but we are led to the conclusion, as a result of our experimental work, that select bacon hogs can be produced by the use of such grains as wheat and barley in combination with oats, fairly early in the pig's life. The use of the heavier grains reduces the percentage of hull in the ration, and the young pigs are able to make better use of the feed consumed. Specific recommendations regarding the percentage of oats to feed to various classes of pigs will be made later.

Barley.—Barley has long been regarded as a desirable finishing feed for pigs in this country. Of recent years we have conducted a number of experiments with a view to determining the place of barley in the ration of young growing pigs, and we are led to conclude that a much larger precentage of barley than was formerly thought possible may be fed to advantage. It has been our experience that the higher the percentage of oats in proportion to barley fed, the more feed is required to make growth, and the smaller the returns for feeding. In this connection an average result of three experiments conducted during the years 1926-27-28 is presented. In these experiments the various grain mixtures were fed in conjunction with skim-milk to pigs running on pasture.

Table VI.—Results of Feeding Various Mixtures of Oats and Barley from Weaning Time to Market Weight.

	LOT I Oats 2 Barley 1	LOT II Oats 1 Barley 1	LOT III Oats 1 Barley 2	LOT IV Oats 1 Barley 3	LOT V Barley Alone
No. of pigs	20	20	20	20	19
Av. Initial wt. lbs.	35.71	36.11	36.15	36.15	35.79
Av. Final wt. lbs.	205.36	203.01	203.09	204.06	205.02
Av. Daily Gain lbs.	1.28	1.31	1.33	1.35	1.37
Feed required for 100 lbs. gain:					
Grain	297.78	295.57	288.39	287.86	285.21
Skim-milk	580.54	568.77	557.04	551.66	551.33
Av. Profit per head over feed cost	$10.49	$10.89	$11.06	$11.21	$11.20
Live Grading of Hogs:					
Select bacon	16	15	17	15	16
Thick smooth	4	5	3	5	3

The results of these experiments appear to justify the conclusion that while oats have been considered a particularly valuable feed for bacon hogs, when the cropping scheme favors the growing of barley, or when the relative prices of these two grains is in favor of barley feeding, a higher proportion of barley than has been common may be safely and economically fed.

Wheat.—Wheat has not been commonly thought of as a pig feed unless in the form of the frozen or lower grades, but

of recent years, with declining grain prices, the place of wheat in swine rationing has been prominently to the fore. The introduction of new early maturing, high yielding varieties of wheat into the barley territory has also been a factor in drawing attention to the value of this cereal in pig feeding.

An experiment conducted at the University of Alberta during the fall of 1928, with a good grade of frozen wheat for finishing pigs weighing approximately 130 pounds indicated that good feed wheat had a slightly higher feeding value than 3 C.W. barley, 100 pounds of wheat being equal to 116 pounds of barley. In this experiment, No. 3 and No. 4 wheat did not give any better results than the good feed wheat. With pigs selling at $8.00 per cwt. live weight, the wheat was marketed through pigs at $1.15 per bushel as compared with 50c per bushel at the elevator.

In an experiment conducted during the summer of 1929, when pigs were allowed to help themselves to ground wheat, oats and barley from separate self-feeders, they showed a decided preference for wheat, and the greater proportion of wheat consumed the smaller was the amount of feed required to produce 100 pounds of gain. The pigs fed wheat graded out well on foot and produced Wiltshire sides of desirable quality.

While in some areas it has been considered an extravagance to feed wheat to pigs, it would appear that this cereal could with profit be incorporated in our swine rations.

Comparative Values of Oats, Barley and Wheat

Some idea of the comparative value of the three common farm grains for growing pigs may be gained from an experiment conducted during the summer of 1933 with pigs starting on experiment at a weight of from 55 to 60 pounds and carrying through until a weight of approximately 200 pounds was reached. These pigs were fed in dry pens without pasture. Tankage was added to the ground grains at a rate of 8% and the pigs had access to the simple mineral mixture outlined on page 45. In addition to groups being fed the individual grains, a fourth group was fed the three grains mixed equal parts by weight. The results of this experiment are shown in Table VII.

Table VII.—Comparison of Oats, Barley and Wheat for Growing Pigs.

	LOT I Oats Tankage 8%	LOT II Barley Tankage 8%	LOT III Wheat Tankage 8%	LOT IV Oats 1 Barley 1 Wheat 1 Tankage 8%
No. of pigs	9	7	9	8
Av. Initial wt. lbs.	59.30	54.47	57.92	61.59
Av. Final wt. lbs.	190.11	208.57	199.78	195.38
Av. Daily Gain lbs.	1.15	1.29	1.28	1.38
Feed consumed for 100 lbs. gain:				
Oats	408.47			107.67
Barley		376.22		107.67
Wheat			353.72	107.67
Tankage	35.52	32.71	30.76	28.09
Total Grain & Tankage	443.99	408.93	384.48	351.10

It will be noted from the above table that the pigs fed barley and wheat grew at about the same rate and more than one-tenth of a pound per day faster than those fed oats. Wheat proved the most efficient grain, followed by barley and then oats on the basis of pounds of feed required to produce 100 pounds live weight of pig. In this experiment the amount of gain produced by 100 lbs. of ground oats was produced by 92 pounds of barley, 87 pounds of wheat and 79 pounds of grain when the three were mixed.

Rye.—This grain is grown quite extensively in some parts of Alberta, and in these areas is relied upon to a considerable extent as pig feed. Compared with the grains already discussed it is an inferior pig feed, lacking in palatability and inefficient in promoting growth when fed alone. In connection with experiments conducted in 1923 and 1924 with finishing pigs, it was found that the pigs took very unkindly to the rye when it was fed as a sole grain, and was only worth 70% as much as barley as a finishing grain. When mixed with oats and barley, or either grain alone, it could be used satisfactorily and economically.

Corn.—This cereal does not occupy a prominent position in pig feeding in Alberta, but improvement in varieties may extend the corn belt at least to the extent of making the crop available for hogging down purposes. On account of its tendency toward fat production and a slight softening effect on the carcass, corn is not favored as a bacon feed, but when mixed with other grains and balanced with milk or other suitable supplements, it might constitute from one-quarter to one-third of the ration.

Screenings.—The question is often asked as to what part screenings may play in pig raising. Screenings of the quality

of "standard recleaned" screenings, containing mainly small cracked grains, wild oats, and buckwheat and free from the small weed seeds constitute a useful pig feed. In an experiment conducted during the summer of 1926, pigs fed ground recleaned screenings along with 5% of tankage made an average daily gain of 1.09 pounds, and only required 394.0 pounds of feed to make 100 pounds of gain. The screenings actually cost $18.00 per ton, and were marketed through the pigs selling at $10.00 per cwt. at $50.80 per ton.

Again, in an experiment carried out during the winter of 1933-34 pigs fed standard recleaned screenings with 8% of tankage gained 1.28 pounds per day and required 454 pounds of the screenings for 100 lbs. live weight gain. Screenings which cost $7.00 per ton were marketed through $6.75 hogs at $30.20 per ton.

Weed Seeds.—While weed seeds are usually utilized in the form of screenings and are thus fed mixed with small or cracked wheat or other grains, there may be times of emergency when they constitute the only feed supply. Of the various weed seeds, wild oats can be utilized to best advantage, and in an experiment conducted during the winter of 1933-34 it was found that wild oats had as high a feeding value as good feed oats. Wild buckwheat has a fairly high feeding value and pig weed seed when mixed with grains can be made use of in pig feeding. Certain experiments indicate that pig weed when fed mixed with grain has a feeding value of approximately 60% that of oats. Seeds of the mustards and stink weed are objectionable and pigs will usually refuse to eat mixtures which contain these seeds in any quantity. All weed seeds should be well ground before feeding.

Shorts or Middlings.—Shorts or middlings have always been regarded as very desirable pig feeds. We conclude after a series of experiments that this feed can not be used with profit unless it can be purchased at a smaller cost per pound than grains are worth on the farm. They have been regarded as a traditional feed for pigs after weaning, but an average result of three experiments conducted in 1924-25-26 covering the month following weaning suggests that farm grown grains may take their place.

Table VIII.—Shorts for Weanling Pigs.

	LOT I Oats 2 Barley 1 Skim-milk	LOT II Oats 2 Shorts 1 Skim-milk
No. of pigs	19	19
No. of days fed	28	28
Av. Initial wt. lbs.	34.37	34.58
Av. Final wt. lbs.	58.13	52.67
Av. Daily Gain lbs.	.86	.66
Feed required for 100 lbs. Gain:		
Grain	188.37	232.37
Skim-milk	542.16	664.39
Cost of 100 lbs. Gain	$3.84	$4.79

If farm grains are of poor quality or are not well ground, shorts will improve the palatability of a mixture and will have a higher feeding value than when good, well ground grains are available.

Bran.—Bran may with advantage be used up to one-half the ration for brood sows prior to farrowing and immediately after farrowing. It is cooling and laxative, and as a result is valuable as a sow feed. Under certain price conditions its use may be recommended for other classes of pigs, but ordinarily its place is limited in economical pig feeding.

Skim-milk.—This is a supplementary feed for pigs par excellence, and pig raisers who have skim-milk available are in a fortunate position. As a feed it is rich in protein required for the production of lean meat and in mineral matter required for the growth of a sound body framework. It is valuable in compensating for some of the deficiencies of farm grown grains, and when supplementing the cereals makes for very economical production. A good deal of Denmark's success in bacon hog production is attributed to the abundant supply of skim-milk in that country.

We are frequently asked as to the value of skim-milk, or what one could afford to pay for it if it could be purchased. Such a figure can best be arrived at by determining the amount of grain which it will replace in pig feeding. This was done in a series of experiments conducted in 1923-24-25 when the influence of skim-milk as compared with other supplements on the quality of the carcass was being studied. Our conclusions as presented in Bulletin No. 15 were as follows.

Grain Prices per pound	Value of Skim-milk per 100 lbs.
½c	16.43c
¾c	24.65c
1c	32.87c
1¼c	41.08c
1½c	49.03c
1¾c	57.05c
2c	65.74c

The value of skim-milk depends upon the rate at which it is fed, and in this connection we recommend the following proportions of grain and skim-milk:

Weaning time to 80 pounds ..... 3 lbs. to 1 lb. of grain
80 pounds to 125 pounds ..... 2 lbs. to 1 lb. of grain
125 pounds to market weight ..... 1 lb. to 1 lb. of grain.

Buttermilk.—What has been said regarding the place of skim-milk in pig feeding holds equally well for buttermilk as it comes from the churn. Buttermilk diluted with wash water or containing a high percentage of any added materials will have a lower feeding value.

Tankage.—In tankage, which is a packing house by-product, consisting of thoroughly cooked and sterilized meat and bone scraps, Alberta farmers have a valuable pig feed and a useful substitute for skim-milk. Tankage serves as a combined protein and mineral supplement. Numerous experiments which we have conducted at the University of Alberta indicate the value of this supplement for young, growing pigs when skim-milk is not available. Space will not permit the presentation of any volume of data from these trials, but the following table, summarizing the results of a series of three experiments conducted during the summers of 1923-24 and 25, with pigs self-fed their grain and running on rape pasture, will give some idea of the value of this feed. In this experiment tankage was fed at the rate of 10 pounds to 90 pounds of grain throughout the trial. Tankage was valued at $50.00 per ton and skim-milk at 30c per 100 lbs.

Table IX.—A Comparison of Skim-milk and Tankage.

	LOT I Grain Skim-milk Pasture	LOT II Grain Tankage Pasture	LOT III Grain alone Pasture
No. of Pigs in Lot	21	21	21
Av. No. of Days on feed	119.5	129.0	214.2
Av. Daily Gain	1.31	1.24	.74
Feed required for 100 lbs. Gain:			
Grain	321.63	392.76	611.84
Skim-milk	694.96		
Tankage		42.12	
Cost of 100 lbs. Gain	$6.14	$5.97	$7.38

The question has often been raised as to whether or not Western Canada, on account of the scarcity of skim-milk for pig feeding, can ever raise high quality bacon hogs. In connection with the experiment quoted above, the pigs were graded by a Government grader when they reached market weight and the carcasses were examined in detail. Our conclusions with regard to this point, as given in Bulletin No. 15, are as follows: "The fact that a higher percentage of 'selects'

were graded out of the groups fed tankage than out of the groups fed skim-milk indicates that a lack of skim-milk need not be regarded as a serious limiting factor in bacon hog production. Pigs fed tankage developed satisfactorily from weaning time and at market weight showed a type and finish which did not suffer by comparison with those fed skim-milk. While the quality of the carcasses yielded by the skim-milk groups tended to be rather better than in the tankage lots, the difference was slight, and on the whole the Wiltshire sides produced by tankage feeding were very acceptable. The feeding of a non-supplemented grain ration did not lead to the development of pigs with the desired type and finish. The comparatively slow rate of growth in these groups gave rise to a coarseness of bone and heaviness of middle, and at reasonable bacon weights many of these pigs lacked the necessary finish."

Linseed Oil Meal.—While linseed oil meal may be fed to advantage in small quantities to brood sows before farrowing, and while nursing litters, it does not seem to have a high value as a sole substitute for skim-milk for growing pigs. In connection with experiments conducted during the winters of 1925-26 and 1926-27 it gave the least satisfactory results of a number of supplements tested from both the standpoint of rate of gain and feed requirements.

Alfalfa Meal.—Good, green alfalfa meal, particularly when made from fine leafy hay, has proven a valuable protein supplement in our winter feeding experiments when the feeding of grain with 5% of alfalfa meal has been checked against the feeding of grain alone, but in comparison with tankage or a mixture of the supplements it has not rated high. Its high fibre content tends to cut down the rate of growth. Its value appears to lie in its being fed in small proportions in a combination supplement or fed by the free choice method on farms where it can be produced.

Fish Meal.—In European countries fish meal is used quite extensively as an addition to the grains in pig feeding. In Denmark, where it can be economically purchased, it often constitutes 10% of the meal mixture. A considerable volume of this feed is being manufactured at the Pacific coast, but under present price conditions its general use cannot be recommended. It may be added in limited quantities to improve a supplemental mixture.

Mixed Supplements.—The mixing of certain of the available supplements usually leads to better results than when any one of them is fed alone. When a mixture of 50 pounds of

tankage, 25 pounds of linseed oil meal and 25 pounds of alfalfa meal, fed at the rate of 10% of a grain mixture, was compared with the single supplements fed at the same rate, in winter feeding experiments, it was found that the mixture gave better results than any one fed alone. This mixture has been used extensively in the United States as a supplement to corn, and as a supplement to a grain mixture, especially for winter pigs in Alberta, it has much to recommend it.

Another mixture which may be regarded as combined protein and mineral supplements may be made up as follows: tankage 50 lbs., linseed oil meal 25 lbs., fish meal 15 lbs., ground limestone 5 lbs., salt 5 lbs. This mixture may be modified by adding 10 pounds of alfalfa meal and reducing the linseed oil meal by a similar amount or in other ways, depending upon the price and availability of the various ingredients.

The mixed supplements are especially valuable in connection with winter feeding or when pigs are pen fed during the summer and not allowed access to pasture. The variety of protein supplied insures good growth and the economical use of feed.

Roots.—While roots may not be regarded as a necessity in pig feeding in Alberta, when they are available, they can be used to good advantage. They are of use for brood sows, providing bulk and succulence, but for growing pigs they tend to utilize too much valuable space in the digestive tract. Potatoes may be boiled and mixed with grain and in this way marketed through pigs in years of low potato prices. In an experiment along this line conducted during the winter of 1922, it was found that 411 pounds of cooked potatoes equalled 100 pounds of grain in feeding value.

Pasture Crops.—Pasture crops should be utilized extensively in Alberta in connection with pig raising unless sanitary feeding pens are available and the proper balancing of rations can be undertaken. If skim-milk is plentiful or other substitutes can be liberally supplied there may be no serious need for pasture accommodation, but under the average conditions prevailing, good pasture crops will do at least two things: (1) provide more sanitary conditions than usually prevail in the pens and yards and thus to a considerable extent avoid the possibility of disease infection and worm infestation; (2) allow the pigs the opportunity of securing some of the protein, minerals and vitamins which may be lacking especially when skim-milk is not available.

Experiments conducted at the University of Alberta of recent years indicate that when supplemental feed is not avail-

able, one may expect from 30 to 50 per cent. more rapid gains and a decrease of from 20 to 30 per cent. in the cost of making gains when pasture crops are used as compared with feeding in the dry lot.

Fig. 10.—General view of experimental groups of pigs on pasture at the University of Alberta.

Crops which have been tested experimentally as hog pastures are: rape, alfalfa, sweet clover, sunflowers, mixtures of oats and fall rye and a cereal mixture consisting of equal parts of oats, barley and wheat. Alfalfa has proven a very valuable pasture crop for pigs, making an early start in the spring and providing a bulk of forage throughout the season. Where alfalfa can be grown it is undoubtedly the peer among swine pastures. Rape has stood next to alfalfa in our experiments. While it does not provide pasture as early as alfalfa, it has a wonderful carrying capacity under Edmonton conditions and maintains a growth until late in the season. It might be stated, however, that good results have been secured from all of the crops tried experimentally. The crops selected will depend upon local conditions, and on this point we conclude that the choice of a crop is really secondary to making provision for green forage in some form.

For the benefit of those who hesitate to use a pasture crop for their pigs on account of the tendency of pasture to cause "blistering" or "sunscalding," we would say that when suitable shelter is provided close to the feed trough or self-feeder, blistering will be reduced to a minimum. When pigs do

become so afflicted, a liberal application of crude oil or old crankcase oil to the affected parts will generally alleviate the condition.

The following table will show the relative performance of two groups of pigs, one self-fed grain in dry lot and the other self-fed the same ration on rape pasture. Tankage was fed at the rate of 5% of the grain ration in both cases, and a small allowance of buttermilk was fed in addition for the first month after the pigs were put on test. Results are based on an average of three experiments conducted during the pasture seasons of 1923, 1924 and 1925.

Table X.—Dry Lot and Pasture Feeding Compared.

	GROUP I Dry Lot	GROUP II Rape Pasture
No. of pigs	22	50
Av. Initial wt.	46.18	45.8
Av. Final wt.	117.25	158.8
Av. Daily Gain	.74	1.16
Feed required for 100 lbs. Gain:		
Grain	510.94	382.5
Tankage	25.57	20.14
Buttermilk	118.4	77.5

In connection with the use of pasture crops for pigs being fed for market, it should be kept in mind that pasture is used as a supplement to grain feeding rather than as a sole means of maintenance as in the case of cattle or sheep. Only in extreme cases of grain scarcity should pigs be forced to graze on pasture without grain or with a very small grain allowance. Best results are secured when pasture is used in conjunction with liberal grain feeding.

Pasture lots should not exceed from ½ acre to 1 acre in size and where a larger area is required, cross-fencing is strongly recommended.

As was mentioned previously, when permanent, sanitary hog houses are available and when skim-milk or suitable substitutes are at hand, a system of intensive inside pig feeding can be followed. Pigs may be satisfactorily pen fed from the time they are weaned until ready for market. This system involves more labor, but the investment in pasture land and fencing is avoided and the difficulty of sunscalding is overcome.

An experiment conducted during the summer of 1934 indicated that pigs self-fed a well balanced ration and pen-fed from weaning time until ready for market, made slightly more rapid gains and required less feed to make 100 pounds gain than similar pigs self-fed the same ration when running on pasture.

Mineral Mixtures.—As time goes on, more and more hog raisers are realizing that simple mineral mixtures may be used to advantages in reducing the time required to put pigs on the market and in reducing feed costs when combined protein and mineral supplements (skim-milk, tankage, etc.) are not being fed. In order that they may grow rapidly, pigs require an adequate supply of mineral matter for skeletal growth. This mineral matter is lacking in our ordinary farm grown grains, and unless this deficiency is made up for, a lack of thrift is likely to develop and such acute conditions as "stiffness," "rickets," etc., may arise. Apart from the minerals required for bone growth, the main one being lime, such minerals as iodine, which prevents the birth of "hairless pigs," and iron, which prevents anaemia in young pigs, may

Fig. 11—Pigs will try and "mine" their own minerals if mineral mixtures are not provided. It is better to supply the necessary minerals and save the pigs' energy.

be lacking. Conditions arising from a deficiency of these elements will, however, be dealt with under "swine diseases" (see page 94).

Our experiments in feeding minerals to pigs indicate that it is not necessary to use complicated mineral mixtures to correct the ordinary mineral deficiencies occurring among Alberta pigs.

A cheap mixture which we designated our No. 1 mixture in 1925, has given satisfactory results in connection with our experiments and on many farms where it has been used. This mixture consists of the following:

Slack coal	76 lbs.
Ground limestone or Air Slacked Lime	3 lbs.
Salt	20 lbs.
Sulphur	1 lb.

This mixture makes use of slack coal, which is available in many areas in Alberta, as a base. Pigs are fond of this material and added to it is lime which is required for bone growth, salt which pigs require in relative small amounts and sulphur which may exert a conditioning influence.

Another mixture which can be used with good results is made up as follows:

Ground limetone or Air Slacked Lime	40 lbs.
Bone Meal or Mono-calcium Phosphate	40 lbs.
Salt	20 lbs.

Fig. 12.—Pigs which are not receiving sufficient mineral will become crippled. This group of pigs were fed during the winter of 1933-34 at the University on a ration lacking mineral.

By way of indicating what may be accomplished by mineral feeding when dairy by-products and tankage are not available, the following table showing the results with two groups of pigs is submitted. This result is based on an average of three experiments conducted during the summer of 1925-26-27.

Table XI.—Results of Mineral Feeding

	LOT 1 Rape Pasture Grain self-fed No minerals	LOT II Rape Pasture Grain self-fed No. 1 mineral mixture
No. of Pigs	20	22
Av. Initial wt.	49.43	51.0
Av. Final wt.	118.36	159.91
No. of pigs	20	22
Av. Daily Gain	.72	1.13
Feed required for 100 lbs. Gain:		
Grain	604.30	414.11
Minerals		23.42
Cost of 100 lbs. Gain	$8.02	$5.49

The mineral mixtures mentioned are best fed by the free choice method, that is, by allowing the pigs to help themselves to the mixture when placed in some such feeder as suggested on page 90.

If slack coal is not available for making up the No. 1 mixture and one chooses to mix certain minerals with the feed, we would recommend the addition of 1 pound of ground limestone and 1 pound of salt to each 100 pounds of the grain mixture. If milk or tankage is being fed, these amounts may be reduced by one-half.

That a lack of lime in the grains definitely results in a slowing up in the rate of growth and a poor utilization of feed is shown by the results of experiments conducted during the winter of 1935-36. The following table shows the performance of two groups of pigs fed inside during the winter months on a grain mixture of equal parts of ground oats, barley and wheat with 1 pound of salt added to each 100 pounds of grain and 1 per cent. of cod liver oil of poultry grade. Lot I did not have any mineral other than salt, whereas Lot II had ½ pound of ground limestone added to each 100 pounds of grain.

Table XII.—Feeding Ground Limestone.

	LOT I Grain No Mineral	LOT II Grain ½% Ground Limestone
No. of pigs in lot	7	7
Av. No. of Days fed	161	155
Av. Initial wt. (lbs.)	46.07	44.62
Av. Final wt. (lbs.)	176.29	206.0
Av. Daily Gain (lbs.)	.81	1.04
Feed required for 100 lbs. Gain:		
Grain	514.14	467.07
Mineral	.....	2.35
Cost of 100 lbs. Gain	$4.23	$3.88

The pigs which did not receive the mineral grew more slowly and required more feed to make their gains than those fed the ground limestone and in addition two pigs in Lot I became badly crippled during the experimental period.

Cod Liver Oil.—Cod liver oil, and pilchard oil as well, are used quite extensively in poultry feeding and can be used to good advantage in the feeding of young pigs, especially when the system of management involves confinement in the piggery after weaning. Cod liver oil contains important vitamins, A (for growth) and D (for bone building). We have carried out a number of experiments at the University of Alberta in connection with the use of cod liver oil (good poultry grade) in pig feeding, especially with fall farrowed pigs closely

housed during the winter months. We have found that it has improved the growth and has assisted in preventing "crippling." In all of our experiments it has more than paid for itself in feed saved. In an experiment conducted in the winter of 1927-28 cod liver oil cost $2.00 per gallon and was worth $3.75 per gallon in terms of grain saved. In a 1935 experiment a gallon of cod liver oil costing $1.00 was worth $3.40 per gallon in grain saved.

Cod liver oil can be fed at the rate of ½ ounce per pig until a weight of from 75 to 100 pounds is reached, or it may be sprinkled on the grain and thoroughly mixed at the rate of 1 pound to 100 pounds of grain.

Preparation of Feeds

Cooking.—It was a common practice on many farms in earlier days to cook practically all feed for pigs, but experimental work and private experience has shown that cooking decreases the digestibility of most feeds, and adds to the cost of production. Many still feel that winter pigs do better when the feed is cooked, but on the basis of three experiments conducted during the winters of 1920-21, 1921-22, and 1922-23, when cooked grain was compared with dry grain fed from the self-feeder, we conclude that the expense of cooking the grain is not warranted. Such feeds as garbage and potatoes are better cooked, but the common grains are more economically fed without cooking. When economy is not an object, slightly better daily gains may be secured with cooked feed, and the palatability of certain mixtures may be improved.

Soaking.—Soaking grain does not seem to be good practice. Even when whole grain is soaked, conditions are not improved; this occurrence is indicated in an experiment conducted during the winter of 1931-32 at the University of Alberta. Pigs fed whole dry grain (oats and barley) gained at the rate of .98 pounds daily and required 455.35 pounds of grain for 100 pounds of gain, while those fed the same mixture after soaking between feeds only gained .76 pounds daily and required 515.26 pounds of grain to make the 100 pounds gain.

Grinding.—We are asked from time to time whether or not it pays to grind grain for pigs. This question is of special interest in times of low prices for grain and hogs. Related to this question is one concerning the degree of fineness to which grain should be ground for pigs. In an experiment carried on during the summer of 1931, it was found that there was little difference in the rate of growth whether pigs were fed

fine, medium, or coarsely ground grain, but that the finer the grinding the less grain was required to make 100 pounds increase in live weight. Based on feed requirements for gain, 100 pounds of finely ground grain was worth 104 pounds of medium ground and 112 pounds of coarsely ground grain. In connection with another experiment conducted during the winter of 1931-32 the grinding of grain resulted in the pigs making faster gains as compared with whole grain feeding. It would appear that moderately fine grinding is to be recommended with the ordinary grains if such treatment can be given the grain at moderate cost.

Methods of Feeding

There are two methods of pig feeding commonly practised: (1) the hand-feeding method, feeding the grain either wet or dry twice or three times daily, and (2) the self-feeding method, where the self-feeder is used and grain is kept before the pigs at all times.

The method to be recommended will depend upon the number of pigs to be fed, the amount of grain on hand, and the rate of gain desired. The relative merits of the two systems have been extensively studied experimentally. The problem was carefully considered in a series of three experiments conducted at the University of Alberta during the summers of 1923, '24 and '25. Hand-feeding was compared with self-feeding with respect to rate of growth and feed requirements and with regard to their influence on the type of pig and quality of carcass produced. In view of the importance of this question the conclusions drawn from these experiments are quoted from Bulletin No. 15:

"Self-fed pigs invariably made more rapid gains than those that were hand fed. In one case the feeding period was shortened by twenty days and in another by thirty-three days. In years of normal market trends, particularly with early spring pigs, this shortening of the feeding period makes possible marketing before the later season slump occurs. In the final analysis the scale of operations will usually determine whether self-feeding or hand-feeding shall be practised. When one or even two litters are being fed, the labor cost does not loom large, but when operations are conducted in a fairly large way, the labor saving properties of the self-feeder come to the fore, and tend to compensate for the slightly higher feed bill which is induced by this method of feeding. Self-feeding gave eminently satisfactory results in the development of pigs of 'select' grade. A higher percentage of selects and a larger number of suitable Wiltshires were graded out of the self-fed

groups, indicating that the self-feeder did not lead to too early maturity and the development of a short thick type of pig."

The experiments suggest that a good deal of labor and often drudgery can be saved by the use of a properly constructed self-feeder, and pigs of the proper type can be economically produced by this method of feeding. Particulars regarding the construction of self-feeders will be found on pages 84 and 85.

Care of the Breeding Boar

Since the breeding boar is at least half the herd, it would seem appropriate to commence a discussion of feeding and management methods with this member of the breeding herd and follow through with the sows and growing pigs.

The boar, like the stallion, on many farms is apt to be a neglected animal. In many cases he is confined to a small pen with very high walls, little provision being made for exercise or company which will help in keeping him from becoming bad tempered.

The ideal treatment for a boar during the summer season is the run of a good pasture lot with just sufficient grain to keep him in good vigorous breeding condition. Young growing boars should receive about 1 pound of grain daily to each 100 pounds of live weight when on good pasture and mature boars from ½ to ¾ pounds of grain daily per 100 pounds live weight. The aim should be to not permit the breeding boar to become too fat and still have him in good vigorous condition. If pasture is not available green-feed may be supplied to the boar in his pen.

During the breeding season the boar's feed allowance should be increased, and as palatable feeds as possible fed, as many boars, especially of the bacon type, are apt to go off feed at that time. A mixture of equal parts of oat and barley chop or two parts oats, 1 part barley and 1 part wheat, along with a small allowance of skim-milk, or from 5% to 10% of tankage, should prove satisfactory for the breeding boar.

Young boars should not be used for breeding until they are from 8 to 9 months of age, and not used too extensively during the first season. The young boar should not be used more than once a day and not permitted to serve a sow more than once. It is a mistake to allow a young boar to run with the sows and breed indiscriminately. Boars in a run-down condition are apt to sire small and weakly litters.

When more than one boar is kept it is a good plan to allow the boars to run together between breeding seasons.

Mature boars should have their tusks removed before turning together, and the occasion of their meeting should be a cool day. The breeding boars run together regularly at the University Farm and no trouble has been experienced in handling them in this way. In tusking boars a noose of stout rope is passed around the upper jaw and made fast to a post or railing in the pen. The tusks are usually quite exposed, and may readily be removed with a pair of bolt cutters or by the use of a crowbar and cold chisel. The first method is much to be preferred, but if the bolt cutters cannot be procured, the sharp edge of a crowbar may be placed against the base of the tusk and held firmly by one operator while the other strikes with the cold chisel and hammer directly opposite the edge of the crowbar.

Care of the Brood Sow

Having secured the right type of brood sow, much of the year's success in pig raising depends upon how she is fed and handled just prior to breeding and during the pregnancy period. Sows which are bred when in good condition, or at least gaining in weight if they have just weaned a litter, and are well nourished during the pregnancy period are much more likely to farrow big strong litters than sows which have been thin and run down when bred and poorly cared for before farrowing.

Sows which have farrowed and weaned spring litters should if possible have the run of a good pasture during the summer months. With good pasture, water and shade, little grain feeding will be necessary, especially with mature sows,

Fig. 13.—Brood sows should have access to good pasture during the summer months. The above illustration shows a few of the sows at the University Farm on their summer pasture.

unless they are quite thin when their litter is weaned. Young growing sows should have grain during the pasture season if they are to be given a chance to develop properly. From ¾ to 1 lb. of grain per 100 lbs. live weight daily along with good pasture will bring the young sow along in good condition. As the time approaches for breeding for spring litters the sows may be given some extra grain if they do not seem to be in the proper state of thrift.

During the winter months, and while the sows are carrying an unborn litter, they should be obliged to take plenty of exercise and should be fed feeds which supply plenty of protein, the material required for tissue growth, and mineral matter, required for the growth of a good skeleton in the newly farrowed pigs. Results secured from our brood sow experiments, as well as the experiences on many farms, show quite clearly that when the brood sow is not properly nourished small and weak litters are likely to be farrowed.

It is a good plan to arrange to have the sows' shelter at some distance from the place where they are fed so that they may be forced to walk a considerable distance for feed. With regard to shelter, the main requirements are a dry bed and freedom from draughts and overcrowding. Sows are successfully sheltered through the winter on many farms in straw stacks or straw-pole shelters where a framework of poles is constructed and straw blown over the frame. At the University of Alberta brood sows have been successfully wintered for several years in colony houses of such type as shown on page 66. These colony houses when banked with straw provide good accommodation for from three to four sows, depending upon their age.

Feeds for the Brood Sow

The ordinary farm grown grains, such as oats, barley and wheat, may form the basis for suitable winter rations for brood sows. Such mixtures as the following have been used satisfactorily at the University of Alberta:

Oats 1 part		Oats 2 parts
	or	Barley 1 part
Barley 1 part		Wheat 1 part

Oats are the safest single grain for brood sows, but there is an advantage in adding some wheat or barley to the oats. Barley and wheat alone are too fattening for sows, and may tend to cause weak pigs and a lack of milk at farrowing time.

With mature sows, supplementary feeds, apart from good green alfalfa or clover hay, or an occasional sheaf of oat green-feed will not be necessary. With young sows which will

Fig. 14.—Young sows which will farrow their first litter should be well fed during the winter months.

farrow their first litter, such foods as skim-milk or buttermilk or tankage are a great benefit. Our young sows at the University are fed approximately 8% of tankage. If roots are available they can be fed to advantage to the sows. One pound of bran added to the feed daily for two or three weeks before farrowing will exercise a laxative and cooling influence.

Grains may be fed ground and either slopped or dry. At the University of Alberta we follow a plan of feeding whole grains at the morning feed, sprinkling it on the frozen ground so that the sows are encouraged to take plenty of exercise in gathering the grain from the ground. The evening feed is fed in the form of slopped, chopped grain.

In order to convey some idea as to the amount of grain required to carry sows through the winter feeding period, and the daily amount necessary to bring sows through the winter in good condition, the following daily allowances are suggested:

Mature sows: .8 to 1 lb. per 100 lbs. live weight during first 12 weeks—1.2 to 1.3 lbs. last 4 to 6 weeks.
Yearling sows: 1.4 to 1.6 lbs. per 100 lbs. live weight during pregnancy.
Gilts: 1.6 to 1.7 lbs. per 100 lbs. live weight during pregnancy.

In districts where there is any likelihood of hairless pigs being farrowed, in fact under practically all Alberta conditions, the feeding of potassium iodide, or the administration of iodine in some form to the pregnant sows, is strongly to be recommended. Particulars regarding this treatment will be found under "Swine Diseases."

A simple mineral mixture such as the coal, lime, salt and sulphur mixture outlined on page 45 should be kept in front of the sows at this stage.

Care at Farrowing Time

Farrowing time is the critical time in the pig business. Heavy losses are apt to occur here unless care is exercised. It is estimated that 40% of the pigs farrowed are lost each year between farrowing and weaning time. A pig which dies at farrowing does not represent a heavy loss, but it means one less pig at marketing time.

The following farrowing time precautions are suggested:

(1) Remove the sow from her winter shelter to a suitable farrowing pen at least one week before she is due to farrow, making plenty of provision for exercise at this time. The length of the pregnancy period in the sow is from 112 to 114 days, or 3 months, 3 weeks, 3 days. It generally pays to bring the sow into some pen where she can be supervised at farrowing. The sow which comes out of the straw stack with thirteen pigs is loudly proclaimed, but the sow which comes out alone after farrowing does not get any publicity.

(2) Properly clean and disinfect the farrowing pen before the sow is placed in it, and where worm infestation is suspected in pens that are regularly used for farrowing, it is recommended that the floors be scrubbed with a strong solution of lye in boiling water (1 lb. of lye to 40 gallons of water). This destroys the worm eggs and prevents the little pigs becoming contaminated while in the farrowing pen.

(3) Provide a guard rail around the side of the farrowing pen. This rail, which may constitute a $2'' \times 4''$, or a small pole, should be placed approximately 8 inches from the floor and projecting out 6 inches from the wall. This guard rail allows the small pigs to seek protection when the sow lies down, and is a wonderful means of avoiding loss by crushing.

(4) Avoid long coarse straw in the farrowing pen. The newly-born pigs may become either tangled or buried in the long straw, and thus are more likely to be crushed. Cut straw or chaff makes the most suitable bedding for the farrowing pen.

(5) In connection with winter and early spring farrowing, especially, the sow should be watched carefully at farrowing time so that help can be given in case of weak pigs or an irritable sow. If the small pigs have become chilled they may be revived by placing them in a box near the stove, or individual pigs may be wrapped in a warm blanket or immersed up to the neck in warm water. When the sow is irritable or clumsy, it is a good plan to remove each pig as it is born and

return the complete litter for nursing when farrowing has been completed and the sow is resting quietly. At this stage it is also well to remove the small tusks from the pigs as they are likely to irritate the sow's udder. The job can be done with small nippers made for the purpose.

Feed and Care of Sow and Litter

Beginners are often anxious to feed the sow heavily immediately after farrowing. Nothing is more detrimental to her welfare. She should not be allowed anything but lukewarm water for the first 24 hours after farrowing. Following that, the first feeds given should contain a high percentage of such feeds as bran, shorts and oats. A bag of bran or shorts on hand at this time can be used to advantage. The feed may be gradually increased and heavier feeds added until the sow is on full feed in from a week to ten days.

The most satisfactory ration at this time is one that includes either skim-milk or buttermilk. These feeds naturally tend to stimulate milk flow and preserve the body weight of the sow, and in addition, as the young pigs learn to eat from the mother's trough, they make more rapid growth when skim-milk forms a part of the ration.

An experiment conducted at the University of Alberta during the spring of 1923 indicates how milk during the nursing period saves the body weight of the sow. Sows receiving a mixture of oats, barley and shorts slopped with water lost an average of 1.53 lbs. per day in body weight during an

Fig. 15.—Yorkshire sow with litter of twelve pigs at the University of Alberta. The nursing sow should be liberally fed to stimulate milk production.

8-week suckling period and weaned pigs weighing 25 pounds, while sows receiving oats, barley and buttermilk only lost .41 lbs. per day and weaned pigs averaging 26 pounds. Weight lost by sows while nursing a litter must be recovered either before they farrow again or go to market, as the case may be, so that feeding to maintain the condition of the sows as well as to stimulate milk flow is a matter of importance.

After the first few days oats, barley and wheat may be used satisfactorily for the nursing sow. We have found the following mixtures satisfactorily:

Oats 1 part
Barley 1 part
or
Oats 1 part
Wheat 1 part
or
Oats 2 parts
Barley 1 part
Wheat 1 part

Some may prefer to feed a higher proportion of oats than suggested above, but unless they are much cheaper than wheat and barley, the practice would not be justified.

When skim-milk or buttermilk are not available, 10 lbs. of tankage to each 100 lbs. of grain is to be recommended or 5 lbs. of tankage and 5 lbs. of linseed oil meal.

Care of the Litter Before Weaning

Feeding.—The small pigs will begin to eat from the mother's trough when they are from two to three weeks of age. When they reach this stage it is better to provide them with a separate trough, as a hungry sow may throw the small pigs against the edge of the trough or the wall and injure them. If the pen is large enough, it is a splendid scheme to pen off a corner leaving an opening where the small pigs may go in for feed, but where the sow cannot enter. This is most feasible when sows and litters are running out in large lots. Grain may be placed in a self-feeder in such a "creep," and the small pigs may help themselves as they please. This is good preparation for the weaning period.

Castration.—Male pigs from all grade sows and male pigs from pure-bred sows which are not good enough to be kept for breeding purposes should be castrated at six weeks of age. Many farmers hesitate to castrate pigs, and prefer to have a neighbor or itinerant handy-man do the job, but the operation can be safely done if a few simple precautions are observed.

Cleanliness, a sharp knife, a fairly generous incision coming well down on the scrotum to permit drainage, and a disinfectant in the wound are the main precautions. For a number of year students have obtained practice in castration of young pigs at the University swine barn, and no casualties have ever occurred.

Ruptured pigs present more of a problem in castration. This trouble appears to be hereditary, or may be caused by sows lying on the pigs. Ruptured pigs should be kept off feed for some time before castration. The pig should be held up by the hind legs and the front end held rigidly to prevent a struggle. In making the incision only the skin of the scrotum should be cut, care being taken not to cut the membrane or sac which covers the testicle. The testicle should then be drawn out enclosed in its membrane, and the intestines kept well pushed back. When the testicle has been drawn out far enough, tie a strong string around the cord of the testicle, including the membrane, and then cut away the testicle and surrounding membrane just outside of where the string was tied. The end of the string about three inches long may be left to hang outside the wound. Some prefer to stitch the wound in order to reinforce the wall of the membrane holding back the intestines. Plenty of disinfectant should be used at all stages of this operation.

Identification.—Where pure-bred pigs are kept, the pigs must be identified under eight weeks of age. White colored breeds, such as Yorkshires and Chester Whites, must be identified by tatoo marking. This is a regulation of the Canadian Swine Breeders' Association. Breeders are allotted identification letters for their exclusive use. The herd identification letters are tatooed or tagged in one ear and the number of the animal with designating year letter is placed in the other ear. As the pigs must be tagged when quite small, care should be taken to insert the tags well down toward the base of the ear so that permanent drooping of the ear may be avoided. The tatoo and tag methods of identification are official. Another method which may be adopted for private use is the ear notching system in connection with which a "V" shaped notch is cut out of the edge of the ear with an ear notcher. A convenient marking system for up to 100 pigs is shown in Fig. 16.

It will be noted that various combinations may be worked out, using notches in one or both ears. While pig No. 5 will only have one notch in the upper part of the left ear, pig No. 8 will have two notches, one at the upper inside and one at the tip of the left ear. Likewise pig No. 32 will have one notch in the top of the right ear and one in the lower centre of the left ear.

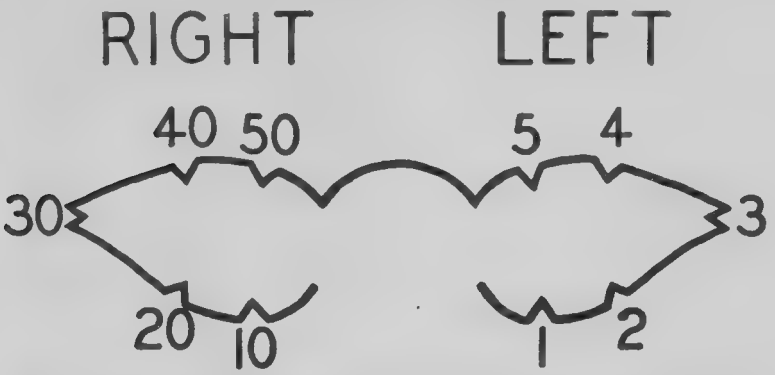


Fig. 16.—System of notching pig's ears for identification purposes. (Reproduced from "Productive Swine Husbandry," by Day.)

Feeding and Management After Weaning

If two litters per year are to be raised, pigs should be weaned at eight weeks of age. Some wean pigs at six weeks regardless of conditions, but pigs weaned at this age are handicapped as compared with those weaned later. If only one litter is being raised and skim-milk is scarce, there may be some advantage in letting the pigs nurse until they are ten or twelve weeks old.

If the pigs have been well acquainted with the feed trough and a good combination of feeds before weaning, there should not be any set-back at this stage. The weanling stage is the critical period in the pig's life, and any condition which makes for unthriftiness at this stage may influence the ultimate type of pig and his suitability as a high class bacon producer as well as the financial return which will be yielded to the raiser.

In our experience young pigs of the proper bacon type may be hand-fed or self-fed right from weaning time. The system which will be followed will depend upon the factors which were discussed on page 48. A combination system of hand-feeding for the first month after weaning and then self-feeding has been very satisfactorily followed under our system of management at the University, and we are inclined to recommend this method when any large number of pigs are to be raised.

When pigs are being hand-fed following weaning there seems to be some advantage in feeding as often as possible during the day. An average result of three experiments conducted during 1924-25 and '26 indicates that five times a day feeding is preferable to three times when it is practical to feed so frequently.

Table XIII.—Frequency of Feeding Weanling Pigs

	LOT I Grain with Skim-milk fed three times daily	LOT II Grain with Skim-milk fed four times daily	LOT III Grain with Skim-milk fed five times daily
Av. No. of days fed	28	28	28
No. of pigs	19	19	19
Av. Initial wt.	34.53	34.11	34.72
Av. Final wt.	58.33	56.50	60.34
Total gain	453.9	425.0	485.9
Av. Daily gain	.86	.81	.93
Feed required for 100 lbs. Gain:			
Grain	194.35	199.33	183.46
Skim-milk	559.71	577.03	528.55
Cost of feed per 100 lbs. Gain	$4.00	$4.17	$3.83

It will be noted that the pigs fed five times daily made faster gains than those fed three or four times daily and the cost of putting on the gain was reduced by the frequent feeding. The gains made by the pigs fed three times daily were quite satisfactory, however, so that when five times per day feeding is not possible, feeding less frequently may not handicap the pigs.

When skim-milk or fresh buttermilk are lacking when the pigs are weaned, some substitute for these feeds should be supplied if best results with newly-weaned pigs are to be secured. We have found that tankage (see page 39) is the best of the readily available substitutes for skim-milk for weanling pigs. Pigs fed tankage instead of skim-milk will not make quite as rapid gains during the first month after weaning

Fig. 17.—Litter mate pigs at five months of age. The pig on the left weighed 107 lbs. and the one on the right weighed 197 lbs. Feeding skim-milk made the difference.

as pigs fed skim-milk, but they will be much more thrifty than pigs fed grain alone, and as the season advances the value of tankage will be more and more appreciated. Many pigs in Alberta fail to grow as they should because no effort is made to substitute for the lack of milk. It will pay well to purchase a supplement at this stage.

Tankage may be mixed with grain at the rate of 5 pounds to 95 pounds of grain for the first week after weaning, or until they become acquainted with this feed, increasing them to from 7 to 10 pounds in one hundred pounds of feed mixture until the pigs reach a weight of around 100 pounds. The small pigs may be allowed to help themselves to tankage if it is placed in a small self-feeder, rather than mixing it with the grain. When this plan was tried in the spring of 1928, it was found that during the first 28 days after weaning, pigs consumed 2.54 pounds of grain and .22 pounds of tankage daily. The tankage eaten was in the proportion of 8 per cent. of the total feed.

The following table shows the rate of gains made by groups of pigs following weaning when skim-milk and tankage were fed and when no supplement was used. The figures are based on three experiments conducted during 1923, 1924 and 1925.

Table XIV.—Supplements for Pigs After Weaning

	GROUP I Grain Skim-milk	GROUP II Grain Tankage	GROUP III Grain alone
Number of pigs	21	21	21
Av. daily gain during five weeks after weaning ....lbs.	.88	.43	.25

Farm grown grains have been found satisfactory for weanling pigs, and where good quality oats, barley and wheat are on hand a suitable feed mixture can be worked out when proper supplemental feeds are provided. If oats are not of good quality or cannot be finely ground, it may pay to sift out the hulls. The following table showing the result of two experiments at the University of Alberta when ordinary ground oats were compared with oats from which the hulls had been removed, may serve as a guide in this connection.

Table XV.—Hulled Oats and Oats Compared

	Oats 2 Shorts 1 Skim-milk	Oats 2 (hulled) Shorts 1 Skim-milk
No. of pigs	19	12
Av. number of days fed	28	28
Av. Initial wt.	34.58	34.61
Av. Final wt.	52.67	55.65
Av. daily gain	.66	.71
Feed required for 100 lbs. Gain:		
Grain	232.37	204.09
Skim-milk	664.39	612.30
Cost of 100 lbs. Gain	$4.79	$4.89

It will be observed from the above table that while the pigs fed the oats from which the hulls had been removed made slightly higher daily gains and required somewhat less feed for growth than the pigs fed ordinary ground oats, the higher cost of the hulled oats made the practice of hulling of doubtful value.

A suitable feed mixture for pigs after weaning may be selected from the following, which have been successfully used at the University.

Oats 2 parts Barley 1 part	or	Oats 2 parts Wheat 1 part	or	Oats 3 parts Barley 1 part Wheat 1 part

The proportion of oats, barley or wheat may be altered slightly one way or the other without danger, depending upon the relative values of the various grains or the quantities of each on hand. As was pointed out before (page 33), many Alberta pigs suffer from the use of too many oats, and in our opinion there is considerable advantage in using a proportion of the heavier grains earlier in the pig's life than has been commonly practised.

Worm Treatment.—Shortly after weaning, if there is a suspicion that the pigs are suffering from worm infestation, they should be treated as recommended under "Swine Diseases."

Fig. 18.—Spring farrowed pigs make good use of pasture as a supplement to grain during the summer months.

Summer Management

Following the after-weaning period, and probably early in June with the average spring farrowed pig, some form of pasture should be available. Pasture crops and their place in pig raising were discussed on page 41, so we need not elaborate on their virtues at this time. We would assert again, however, that under average conditions in Alberta they appear to fill a real need in the pork making scheme.

When milk is not being fed, even though pasture is available, we would suggest the use of tankage or the mixed supplement outlined on page 41, at least to the extent of about 5% of the grain ration until the pigs reach a weight of 150 pounds. After this weight the necessity for tankage is not as marked, and if a suitable mineral mixture is being fed it may be eliminated.

Oats, barley and wheat may be used in various combinations at this stage, and the following mixtures are suggested:

				Wheat 1		Oats 1
Oats 1		Oats 1		Oats 2		Barley 1
Barley 1	or	Wheat 1	or	Barley 1	or	Wheat 1

Water.—If possible, water should be kept in front of the pigs at all times during the summer. The automatic waterer, when attached to a barrel as shown on page 89, makes provision for a steady water supply.

Shade.—If natural shelter is not available in the form of brush, colony houses work in well for summer shade. Shelter should be convenient to where the pigs feed, or they may spend too much time in the sun and suffer from sunburn or sunscald. This is a serious problem, especially with white pigs, and causes a good deal of worry and loss on many farms. Blistered pigs should be well smeared with oil; old crankcase oil will be found suitable.

Finishing Feeder Pigs.—We find in years of normal price trends that the pigs sold in September or early October, as compared with those sold during the later months of the year, show the greatest profit over feed cost. For that reason, and also to insure proper finish at suitable weights, liberal grain feeding during the pasture season is to be recommended. Under such conditions many pigs will be ready for market before the close of the pasture season. Late farrowed pigs, however, will not be ready for market at the close of the pasture season and for such pigs pen feeding or finishing will be necessary.

It is important that the finishing process be managed so that the pigs are properly finished at weights of around 205 to 215 pounds at the farm. Pigs which are underfinished at these weights are very objectionable at they dress out thin, flabby carcasses if slaughtered, and if taken off the market as "feeders" many are likely to develop into "heavies" or "extra heavies" before they show sufficient finish.

If pigs have been self-fed during the growing or "pasture" stage, there is usually some advantage in changing to slop feeding during the finishing period of from 150 to 210 pounds, although where the labor feature suggests the continued use of the self-feeder, very good results will be secured.

Oats, barley, wheat and rye may all be used in working out suitable feed combinations for finishing pigs. Barley is the best finishing feed and when available it should form a large part of the finishing ration. Wheat has given good results in our finishing tests and can be used with barley or as a substitute for it. Rye is not relished by pigs, but can be utilized when mixed with the other grains. In one of our 1923 experiments a mixture of equal parts of oats, barley and rye gave very good results. Oats are a relatively inefficient finishing feed and should be reduced to a small proportion or eliminated altogether from the finishing mixture. In view of the fact that barley and oats are the grains commonly available on most farms in Alberta for finishing pigs, the following table summarizing the results of two trials conducted in 1920 and 1921 is submitted:

Table XVI.—Barley and Oats for Finishing Pigs.

	LOT I Ground barley self-fed	LOT II Ground barley 2 ground oats 1 S.F.	LOT III Ground barley 1 ground oats 1 S.F.	LOT IV Ground barley 1 ground oats 2 S.F.	LOT V Ground oats S.F.
No. of pigs	18	18	18	18	19
Av. days to reach market wt.	58.2	67.6	70.2	79.7	122.1
Av. Initial wt.	113.2	110.7	112.9	107.2	108.9
Av. Final wt.	185.3	185.0	185.0	185.2	185.0
Av. Daily Gain	1.24	1.10	1.03	.95	.62
Feed required for 100 lbs. gain	581.3	658.4	765.5	725.4	1070.0

It will be noted that as the percentage of oats in the rations was increased in these experiments the rate of gain was reduced and the feed requirements were increasd. When oats alone were fed gains were slow, and the amount of grain required for 100 lbs. gain was extremely high.

In the above experiment no supplementary feeds were fed, and the grain requirements were higher than would otherwise have been the case. When pigs are finished in the dry lot, tankage or some other supplement may be fed at the rate of 5% to good advantage. From ½ to 1 pound of ground limestone and the same amount of salt can also be added to each 100 pounds of grain. Grain mixtures suggested for finishing pigs of 150 pounds in weight are as follows:

Oats 1 part Barley 3 parts	or	Oats 1 part Wheat 3 parts	or	Oats 1 part Wheat 1 part Barley 2 parts

Farm Grown Grain Mixtures

In the preceding discussion various grain mixtures have been suggested for pigs of different ages. By way of review it may be stated that, in our opinion, the Alberta farmer who can grow oats and barley, or oats and wheat, or oats, barley and wheat will have feeds that will make him independent so far as grain mixtures are concerned. As has been pointed out, when milk is lacking some substitute should be provided. With the grains his main concern will lie in working out satisfactory proportions as the age and weight of the pigs advance. In order to bring together some of the suggestions already presented, the following plan is offered:

Table XVII.—Proportion of Farm Grains for Pigs of Various Weights.

Weight of Pig	Lbs. of oats in 100 lbs.	Lbs. of barley or wheat in 100 lbs.	Lbs. of tankage in 100 lbs.	Total
Weaning to 60 lbs.	60	30	10	100 lbs.
60 lbs. to 100 lbs.	50	42	8	100 lbs.
100 lbs. to 150 lbs.	40	54	6	100 lbs.
150 lbs. to 200 lbs.	20	75	5	100 lbs.

The Production of Fall Pigs

As was pointed out on page 12, one of the major pig marketing problems in Western Canada develops out of the uneven distribution of marketings throughout the year. A great many more pigs are marketed during the fall and early winter months than during the spring and early summer months, a condition which disturbs the processing end of the business, as well as marketing connections for the finished product. Successful catering to the British market must depend on a steady volume of supply throughout the various months of the year.

The raising of two litters per year instead of only one by at least a fair percentage of the sows would tend to equalize

the marketings, and in addition would lower the cost of production. The cost of carrying a sow for the year is very little greater when she farrows twice than when she farrows only once.

Fall pig raising fits in very well with the practices that are being followed on many farms. Winter dairying is on the increase on certain farms, and in such cases a supply of skim-milk is available for the fall pigs. Labor is more plentiful in the winter time, and the caring for the pigs is not as much of an "overtime" job as is the case during the rush of the summer season.

Dates of Farrowing

For best results fall pigs must be farrowed fairly early so that they will have a chance to make a good start before the cold weather sets in. We have found that from September 1st to September 15th is a good time to have the fall pigs arrive. Farrowing conditions are generally ideal in Alberta

Fig. 19.—The late farrowed fall litter is more or less handicapped as compared with the one farrowed before the cold weather sets in.

at that time, and pigs born then make good growth during September and October while with the sow, and reach a weight of from 40 to 50 pounds before any real cold weather sets in. Cold weather does not bother such pigs, and they are ready to go into winter quarters and give a good account of themselves. These pigs reach the market late in March or early in April (depending upon the method of feeding) when it is at a favorable point, and are disposed of before the rush of spring work commences.

It has been our aim at the University of Alberta to have the fall pig reach a marketable weight in from six to seven months, the same as those born in the spring. In order to have the pigs born from the 1st to the 15th of September, the sow must be bred between May 10 and 25. If she is to wean her litter before she is bred, she must farrow from the middle to the end of March. Farrowing at this season suggests the necessity for some provision for heating accommodation in the farrowing pen and special watchfulness at that time.

Shelter for Fall Pigs

It is a common belief that fall pigs need some elaborate shelter if they are to come through the winter satisfactorily. The fall pig, like the brood sow, must have dry, well bedded quarters which are free from draughts, but these need not necessarily be expensive. Straw shelters have proven satisfactory on many farms, and at the University of Alberta colony houses have proven very satisfactory shelters for fall pigs. The gable type house shown in the illustration in Fig. 20 has been used more than any other shelter for fall pigs at this institution.

The 6′×8′ colony house will accommodate from eight to ten fall pigs comfortably. In locating the colony houses for the winter, they should face south and be crated and banked to the eaves with straw (see Fig. 20). A heavy burlap sack hung over the door breaks the wind and provides suitable protection for the doorway.

If a well built permanent piggery is available, pigs can be satisfactorily fed in it during the winter months. Such buildings should be insulated and well ventilated to prevent the accumulation of frost on the walls and ceilings during the extremely cold spells. A small stove in such a building will work wonders in preventing frost accumulation and dampness.

During the winter of 1936-37 an experiment was conducted to compare the feeding of fall pigs sheltered in colony houses (as shown in Fig. 20) with others sheltered in the permanent piggery with artificial heat provided. The two groups of pigs were similar in breeding and were fed the same ration with the exception that the pigs which were confined in the piggery were fed cod liver oil at the rate of 1 pound to each 100 pounds of grain and supplement until they weighed 100 pounds.

The results of the experiment are shown in the following table:

Table XVIII.—Method of Housing Fall Pigs.

	LOT I Piggery, Heated with Stove	LOT II Colony House
No. of pigs in lot	5	5
No. of days on Experiment	112	128
Av. Initial weight	43.7	41.9
Av. Final weight	212.0	207.0
Av. Daily Gain	1.50	1.29
Feed required for 100 lbs. Bain:		
Grain	327.01	352.78
Supplement	43.44	47.87
Total	370.45	400.65
Cost of 100 lbs. Gain	$5.93	$6.42
Profit per pig over feed cost ($8.00 per cwt.)	$4.45	$3.45

It is to be noted that the pigs fed in the piggery where some heat was provided made their gains more quickly and at a lower cost for feed. The piggery which was heated with a small stove accommodates approximately 70 pigs. Based on the number of pigs which the building accommodates, rather than on the 5 pigs actually on test, the saving in feed amounted to approximately $50.00. It required 3 tons of coal at $4.00 per ton to heat the building, so that the use of the stove was amply justified on the basis of feed saved. At the same time, the pigs fed in the colony houses made very satisfactory and economical gains and returned a fair profit over feed cost considering 1936-37 grain prices. It would seem that while the permanent piggery may have some advantage over the colony house as a shelter for fall pigs, the colony house, with outdoor quarters, will render good service.

Fig. 20.—Gable type colony houses banked to the eaves with straw and with a heavy sack hung over the doorway, provide good shelter for fall pigs.

Suitable Rations for Fall Pigs

In formulating rations for fall pigs, it is well to keep the following general principles in mind: (1) The fall pig cannot make use of pasture or green-feed in the same sense as the spring pig, and thereby help to balance his own ration; (2) gains should be such that the fall pigs will be pretty well all marketed before the spring crop of pigs reach the stage where they demand housing accommodation and the bulk of the spare time at a busy season.

Unless the ration of the fall pigs is well balanced, gains are likely to be slow and comparatively expensive, resulting in pigs hanging on at a season when they should be out of the way.

Grain Mixtures

With regard to grain mixtures for fall pigs, what has already been said concerning the use of farm grown grains and the most suitable proportioning of these grains will apply equally well here.

Supplementary Feeds

When skim-milk or buttermilk are to be had, there will be no difficulty in feeding fall pigs. When such feeds are not available, we are quite sure from our experimental findings that some substitute must be provided. The spring pig may get pasture, but the fall pig is deprived of this source of additional protein. Here again, tankage will prove of great value when added to the grains. The proportions recommended for spring pigs will do equally well for the fall pigs, although the use of a higher proportion with the fall pigs will be an advantage. The mixed supplements discussed on page 41 have given us very good results with fall pigs. The small percentage of alfalfa meal, in a sense, takes the place of pasture and supplies the "sunshine vitamin" which is of value during the winter months.

Mineral Matter for Fall Pigs

The pig grown during the summer months may supplement the mineral supply of the grain fed by using pasture, or even by "rooting" up the pasture lot. The fall pig is for the most part grown under conditions which deprive him of the use of forage and contact with the soil. For this reason the question of a mineral supply is of even greater importance in the case of the fall farrowed pig than with the

spring pig. Mineral supplements work hand in hand with protein supplements in rounding out complete rations for fall pigs. Either one will improve the ordinary grain feeds in fall pig feeding, but the two should be combined for the best results. The effect of a lack of mineral is shown in the results of an experiment discussed on page 46 (see Table XII).

Sunshine for Fall Pigs

Winter sunshine acts as a tonic for fall pigs. We know from our experimental results that it is decidedly beneficial. Pigs which are closely penned during the winter and not allowed to run out in the sunshine are very apt to become "stiff" and crippled with what is commonly called rheumatism. The ultra-violet rays of the sunlight exert a beneficial influ-

Fig. 21.—Litter mate fall pigs at six months of age. The pig on the left weighed 230 lbs. and the pig on the right weighed 80 lbs. Feeding ground limestone made the difference.

ence on the growth of the skeleton. Pigs not allowed exposure to the sun's rays suffer from poor mineral utilization, and may develop rickets (crooked legs and lameness), or other symptoms of mineral deficiency. The moral is, let the fall pigs "sun" themselves, even though the temperature may not be high, or if penned inside feed cod liver oil (see page 46).

Watering Fall Pigs

When skim-milk or buttermilk is not abundant, and when grain is fed dry, fall pigs will use a considerable volume of water. If possible, it should be supplied three times daily, and the trough kept as free as possible from ice. It is doubtful if the expense of warming the water is justified. In an

experiment conducted at the University of Alberta during the winter of 1923-24, the warming of water did not effect any improvement. Pigs allowed cold water gained an average of 1.07 pounds daily, as compared with 1.02 for pigs given warm water. There was no significant difference in the amount of grain required for growth in the two groups. A similar result has been secured at other experimental stations.

Fall Pigs Pay Their Way

During the period from 1922 to 1936 approximately 2,800 fall pigs have been farrowed at the University of Alberta. The majority of these pigs have been used in experiments regarding the feeding and management of pigs and finished during the winter months, and in addition the economics of the business has been carefully checked. Over this period of years fall pigs have returned a satisfactory profit over and above feed costs, even after grain prices were charged at 20% higher than elevator prices. The margin between cost of production and selling price has varied year by year depending upon the relationship between hog and grain prices, but over the period of years fall pig raising has proven profitable.

It has been clearly demonstrated in our fall pig experiments, however, that the feeding of protein and mineral supplements is a necessity if economical gains are to be made. The large number of inquiries which we receive each year during the late winter months, regarding slow gains and "crippling" among fall pigs, indicate that more attention must be paid to better balanced rations.

APPENDIX A.

CURING PORK ON THE FARM

There is no class of consumer in Alberta who has a better opportunity to consume high class meat products than the farmer. At most seasons of the year he is independent of the meat purveyor and may select and slaughter on the farm animals of the proper quality and at the weight and degree of finish to suit the individual family requirements. While it is true that the best is not always utilized for home consumption, the fact remains that the farmer has it within his power to produce and process for use on the farm as fine meats as can be purchased in the highest class meat shops.

On the majority of farms pork is a staple article on the menu during the greater part of the year. There would appear to be no reason why pork should be purchased for use on the farm, and still this practice is followed on many farms. In a time of financial stress, such as is being experienced at the present time, the use of home produced pork is a means of reducing the cost of living. The selling of live hogs and the purchasing of cured hams and bacon on the farm does not look like sound economics.

The slaughtering of live hogs and the curing of pork are not involved processes, and when a few simple principles are carefully followed, a good dressed carcass, and finally an attractive cured product, is assured. In order that those who have not previously cured pork on the farm may have something to guide them in their operations, the following passages are quoted from a well known book "Farm Meats," whose author is Professor M. D. Helser, of the Iowa State College. The "cures" which are suggested by Professor Helser have been extensively used, and we can vouch as to their reliability when his instructions are carefully followed:

Vessels for Curing.—"Oak barrels or large stone jars are the most satisfactory vessels for curing. The stone jars are somewhat expensive and apt to be broken, but are quite easily kept clean. If meat spoils in them, they can be easily cleaned and used again. A clean container is absolutely essential for successful meat curing. Vessels should always be thoroughly scalded out before being used. Do not take any chances with the curing vessel, as a great deal of meat is spoiled in this way every year."

Methods of Curing Meat.—"There are many methods of curing meat, most of which are simply a variation of two principal methods, the brine cure and the dry salt cure.

Curing Agents.—"Common salt is the basis of all meat curing. It has a preserving effect and has a tendency to make the tissues hard and dry by driving out the moisture and meat juices. Sugar is sometimes used to give a sweet flavor, and it aids in counteracting the action of the salt by keeping the muscles soft. Brown or white sugar may be used; the old fashioned brown sugar usually gives a little better flavor. Syrup may be used in place of sugar. Saltpeter (Potassium Nitrate) may be added to give a red color, and it also has some preserving effect. Sodium Nitrate (Chili Saltpeter) may be used in place of the potassium nitrate. Use about ⅕ less Sodium Nitrate than Potassium Nitrate. Without the use of saltpeter the meat will be gray in color when it comes

out of the cure. The red color is made by the formation of nitrous acid, which acts on the hemoglobin, producing a bright red derivative (hemorrhoidon). Baking soda is quite often added to the brine cure to keep it from souring. Other ingredients are sometimes added for flavoring. Salt, sugar and saltpeter make the best combination for curing meat. Common salt, however, is the only absolutely necessary ingredient. An excellent product can be made with salt alone.

"In all cures be absolutely sure that the meat has all of the animal heat out of it and that it has not been frozen. A great deal of meat is lost every year by allowing the meat to freeze before curing or during the curing process.

Place for Curing.—"A cool, well ventilated cellar is a very desirable place for both brine and dry curing. The smoke house is quite often used for curing as well as smoking. Cold storage rooms make the best place for curing meat; here a uniform temperature may be maintained, and there will be no doubt about the meat spoiling in the centre before the salt works in and no danger of the meat freezing.

"Either the brine cure or the dry cure will produce a first-class product. The beginner usually obtains a more uniform cure with the brine method. This method is not so satisfactory in warm weather or when the temperature ranges above 40°F. The brine will sour and the meat will spoil. Splendid results may be obtained with the dry cure if you are careful to get the cure rubbed on evenly.

The Brine Cure.—"If sugar is added, this cure is known as the 'sugar cure' or 'sweet pickle'.

"For each 100 pounds of meat use:

12 lbs. salt,
3 lbs. sugar,
2 ozs. saltpeter,
6 gals. water.

Thoroughly mix the salt, pulverized saltpeter, and sugar (either brown or white, brown preferred), and rub some of the mixture into the hams, shoulders, and bacon. Pack all meat, ham, shoulders, bacon, and jowls in the same vessel. Put the skin side down on all but the top layer; there put skin side up. Weight this down with hard burned tile or brick or some hardwood. Never use pine wood or limestone. Be sure to weight this down before pouring the brine in, because some of the meat will float.

"Boil the six gallons of water to make sure that it is absolutely pure. While the water is still warm, dissolve the ingredients left after rubbing the meat. After the brine has

cooled, pour it over the meat. Be sure that all the meat is completely covered with brine. Set aside in a cool, well-ventilated place to cure about three days per pound for each pound of ham and shoulder. Two days per pound is sufficient for the bacon. Hams and shoulders weighing twenty pounds or more should be cured three days per pound per piece. Pieces weighing over twenty pounds should be skinned or trimmed down to at least twenty pounds in order to obtain a satisfactory cure. Bacon weighing around ten pounds will cure in about two or three weeks; the jowls will cure in one week. In order to insure a uniform cure, the meat should be repacked in seven days, leaving out the small pieces such as the jowls. After the meat has been weighted down, pour the brine over the meat, unless the brine is sour and ropy. Sour brine should be thoroughly boiled and some soda added before using it again. It is safer to make new brine, scald the barrel thoroughly, and wash the meat thoroughly. In case a new brine is made, do not make it quite as strong as the first, and do not leave the meat in quite so long as would have been done with the first brine. The brine should be carefully watched for souring and ropiness. The meat should be repacked again on the twenty-first day of the cure, and the bacon removed. When the meat comes out of the cure, wash thoroughly in hot water to get the grease off to the rind, then wash in cold water and hang in smoke house to drip about twenty-four hours before smoking.

The Dry Cure.—"Here again salt is the basis, but any of the other ingredients may be used if a sweet flavor and a red color are desired.

"For every 100 lbs. of meat use:

8 lbs. of salt,
3 ozs. saltpeter,
3 lbs. sugar (brown preferred).

Mix the ingredients thoroughly and rub half of the mixture on the meat. If the weather is above 45°F. it is advisable to push some of the salt up along the shank bone and some into the hip joint where the ham has been cut from the side. This will get some salt to the inside of the ham before it has a chance to spoil. Many people think that as soon as the outside of the ham is salted, it is safe, but the inside must keep until the salt has had a chance to work in. In seven days rub the other half of the mixture on the meat. The small pieces may be left out this time. Repack again on the twenty-first day of the cure and remove bacon. There will be some liquid in the bottom of the vessel. The meat from the top of the pack should be placed on the bottom and vice versa, this time

to get a uniform cure. Three days per pound per piece will be sufficient for the hams and shoulders. Wash the meat with cold water and hang in the smoke house to drip for twenty-four hours before smoking. Be sure to hang the pieces so that they do not touch each other.

"If you expect to use the meat from either of the above cures before the weather gets warm, or within 30 or 40 days after curing it may be taken out of the cure in a little less than three days per pound per piece. If you expect the meat to keep during the hot summer months, three days per pound per piece will not be too much."

APPENDIX B.

EQUIPMENT FOR SWINE RAISING

BY

J. MACGREGOR SMITH, Professor of Agricultural Engineering

The section of this publication which follows is included to draw attention to plans of certain pieces of swine raising equipment. It also covers plans of hog houses.

Since the first edition of this bulletin was published there has been a good deal of interest in the Danish type of piggery which has a dunging alley. Early this year the Alberta Department of Agriculture, co-operating with the University Departments of Animal Husbandry and Agricultural Engineering, prepared plans (pages 78 to 80) from a piggery built at Spruce Grove. Those plans are available on separate sheets, but for convenience have been reduced in size to fit this publication.

The importance of ventilation has been emphasized and the main points to be carefully considered will be found on page 74.

The idea in presenting these plans is not to suggest that each one must necessarily be followed exactly as illustrated, although they are drawn from models which have proven to be satisfactory, but should be used more as a guide to the general type of construction. They may be modified to meet the needs of the individual farm, depending upon the scale of operations. Most of the plans submitted are drawn from equipment which is in common use on the University Farm.

Ventilation.

The problems of ventilation are easily taken care of in the first buildings, which are generally erected on the farm. Log stables, straw sheds and sod barns are usually constructed so that the air circulates quite freely through them. However, when more permanent buildings are erected some provision must be made for proper ventilation if they are to provide comfortable quarters for live stock. A well constructed building with no provision for admitting fresh air in small quantities and for taking off the warm foul air in large quantities will result in a damp stable. The walls will be wet or covered with frost; harness and fork handles as well as the stock will be wet.

It is hardly necessary to point out that the climate of western Canada creates some difficult problems in ventilation. The system shown in the plans is the single outtake King system. Professor L. G. Heimpel of Macdonald College did some research work on this problem and found that the single outlet was quite adequate. On receipt of his bulletin about two years ago the writer discussed the problem of ventilating a new piggery being erected by J. H. McLaughlin at Spruce Grove, and it was decided to install the system. Careful records were kept on inside and outside temperatures for two winters (1935-36 and 1936-37). The results were very satisfactory. The barn was dry inside and the pigs were comfortable. The barn was planned on the Danish system and in sub-zero weather a stove was used. It is recommended that some artificial heat be provided in extremely cold weather because pigs do not create much heat and they are more susceptible to ailments resulting from draughts and dampness than are other classes of live stock.

It may be well at this time to point out that **unless the barn is to be well built, with the walls (6″ studding) insulated and with all windows provided with storm sash and doors with storm doors,** there is little use spending any money installing a ventilation system.

Dry coarse planer shavings make good insulating material. Hydrated lime may be dry mixed with them to prevent rodents working. Two pounds of lime to every hundred pounds of shavings. There are also other insulating materials sold commercially.

The ingoing air enters the barn as shown in the side elevation and wall section views. A partition is placed between two studs, the inside part being insulated. It will be seen that the fresh air is directed upwards and through a small hinged door, which will allow a little air to enter even

when in the closed position. In connection with the construction of inlet flues it is to be noted that the space between two studs is divided as shown in "Wall section through air intake." It is insulated on the inside. It is important that the cover on the opening at the ceiling be made so that there is, even when it is in the closed position, a space of about an inch.

The outlet flue rises from the floor and if one does not feel that it has to come out on the ridge of the roof it is recommend that it be carried **straight up through the roof.** In either case it must rise above the ridge. In a piggery built by P. J. Rock of Morrin the ventilator was installed quite near the end of the barn (on the inside) away from the stove, and the system worked very satisfactorily. The outlet flue must be built so that there is no leakage of air. There must be two ply of lumber with paper between, but insulated board is recommended. The flue rests on the ground and if possible should be vertical from the bottom to the top. Construction is simplified and it will operate to better advantage.

The "detail of the ventilator" shows one type of construction where panels of matched lumber are constructed on the ground and after one is erected, plumbed and braced, the others are put in place. (Horizontal joints should be staggered.) Cross cleats and corner strips hold them together. Insulating board can then be fastened on the corner boards, thus leaving an air space. In another type of construction corner posts are set up, plumbed and braced, and the sides enclosed with horizontal boarding, then paper and V-joint lumber vertically. The door at the floor level is provided with a counterweight which can be easily adjusted. The amount that this door is open controls the amount of air entering the barn. No system can work efficiently without careful attention by the man in charge of the building. The top of the outlet flue should have no louver boards to obstruct the outgoing air. A heat door in the flue at the ceiling will be useful in mild weather.

It may seem to many that there are too many details to be considered, but in was pointed out in the beginning there is no possibility of reasonable success unless the building is carefully constructed. A single ply lumber building, unlined and with the ceiling unlined cannot be ventilated, and there is little use wasting time in trying to find a way to do it. In a more moderate climate, windows may swing in from the bottom and no difficulty is encountered in ventilating the building.

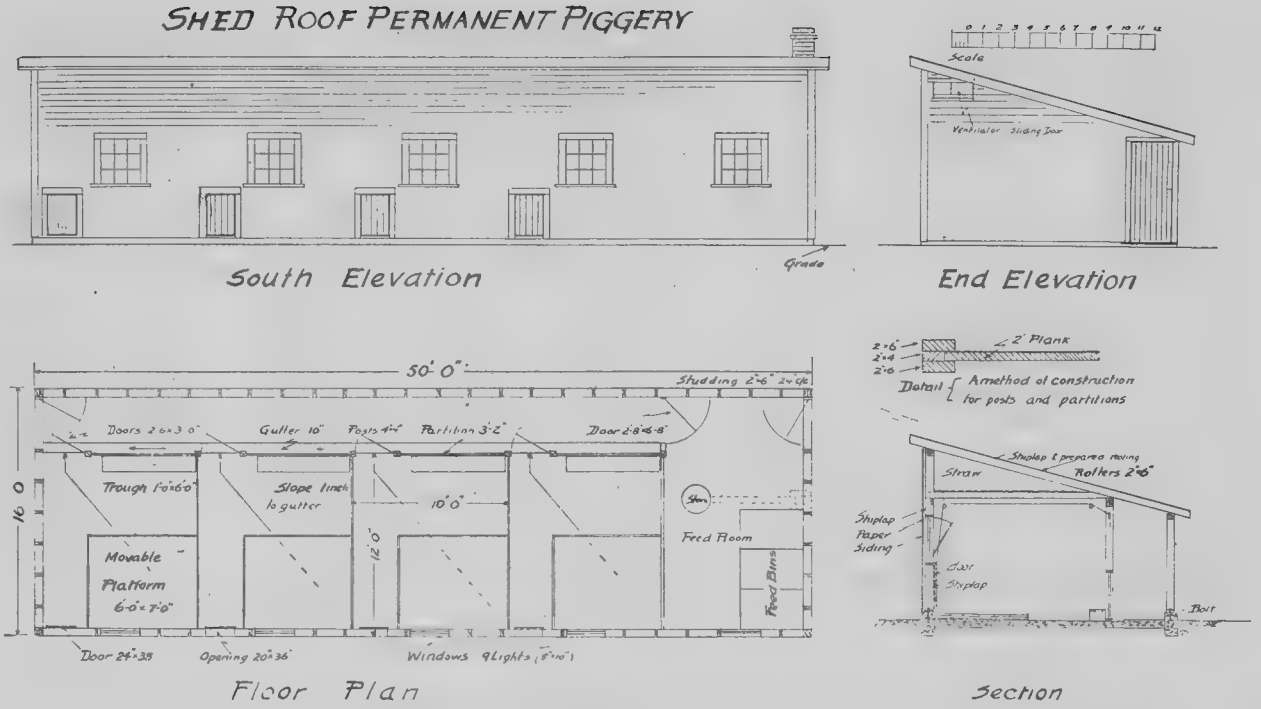


Fig. 22.—Plan for 16′×50′ Shed Roof Permanent Piggery, providing for four pens and feed room.

Shed Roof Permanent Piggery.

The small permanent piggery (shown in Fig. 22) may be used for farrowing purposes and for finishing pigs. The pens are of such size as to allow plenty of room for a sow and litter, and the partitions may be made movable so that the building can be converted into a large finishing pen.

This building is on a concrete foundation 10 inches wide and 18 inches in depth (concrete mixture 1 to 5:33 bags of cement, 7 yards of gravel; the concrete floor 5 inches in thickness would require 67 bags of cement, 13 yards of gravel). The studding is 2″×6″, as are the rafters. The sill is bolted to the foundation, the bolts being set in the concrete at the time it is placed. The pens are 10×12 ft., with a movable sloping platform 6×7 and a movable trough 1 foot wide by 6 feet in length. The concrete floor has a slight slope towards the door and into the gutter. A detail of the posts is shown—4″×4″ posts would be sufficiently strong, the purlin running horizontally to support rafters, 2 pieces of 2″×6″, but the method of construction shown makes an easy way of putting a strong partition into place. The feed room is equipped with a stove for the purpose of heating the building slightly at farrowing time. It is suggested that a section of the wall between the pens and the feed room be movable, either sliding up or down or on a hinge, so that some of the heat can circulate through the building. It would be quite possible to place the feed room in the centre of the building. The building as a whole is shown to offer some suggestions that could be followed. It could easily be increased in length to accommodate the number of pigs that are kept. The windows are important, being 9 lights 8×10 inches, hinged at the bottom to swing in. The walls on the outside are covered with shiplap, paper and siding. It is suggested on the inside that they be boarded up with shiplap as far as the bottom of the windows. It is important to have this building facing south and also to have the windows placed as shown, as this will give a good deal of sunlight on the floor between the platform and the feeding trough during the spring season. The roof could be made of shiplap and prepared roofing or common boards with paper and shingles.

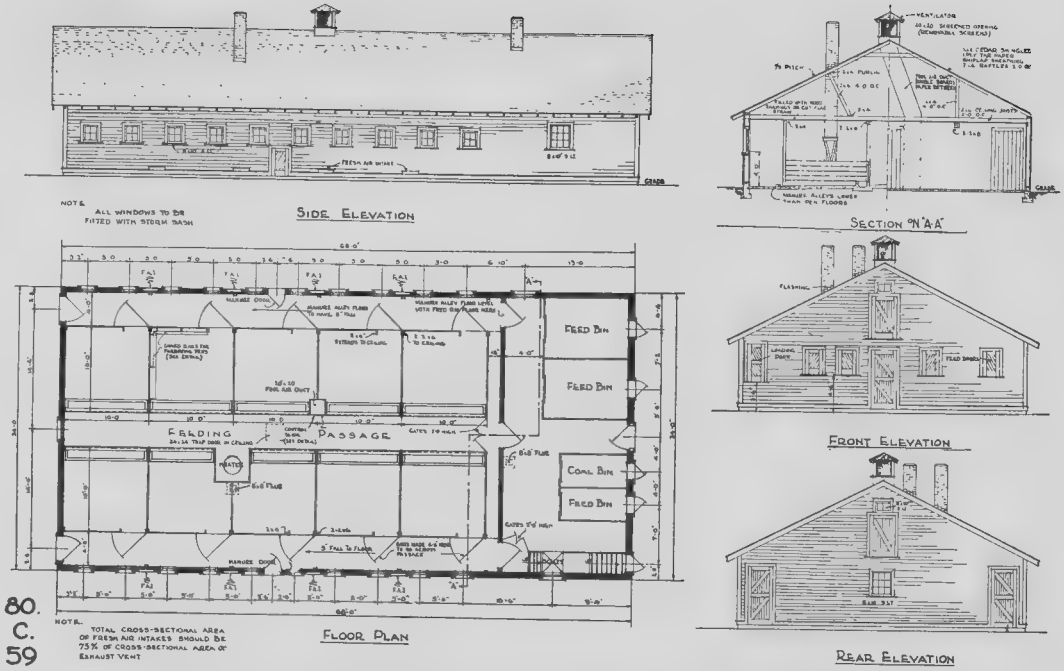


Fig. 23.—Plan for ten pen permanent piggery based on the Danish arrangement with litter alley separate from pens.

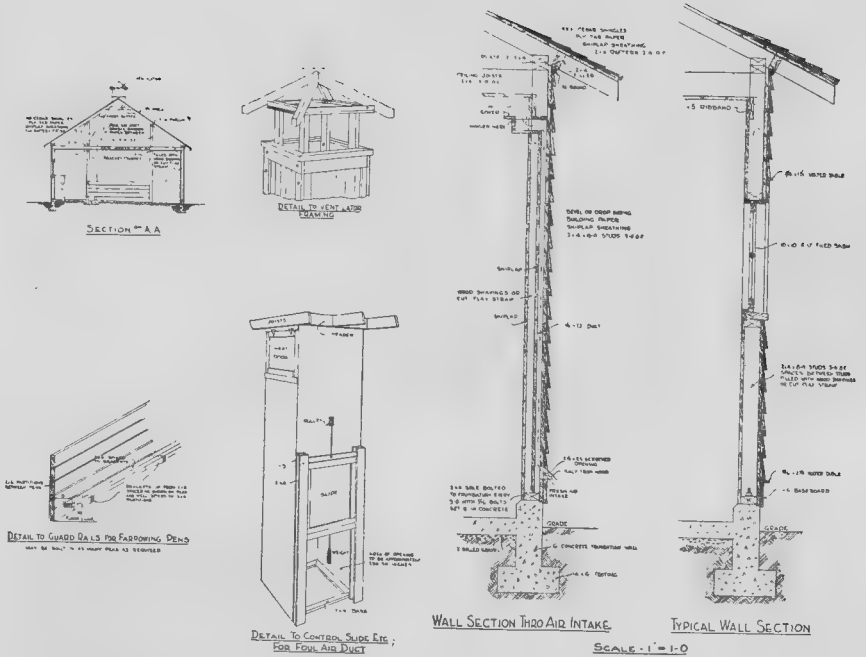
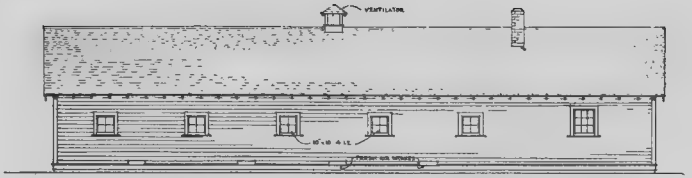
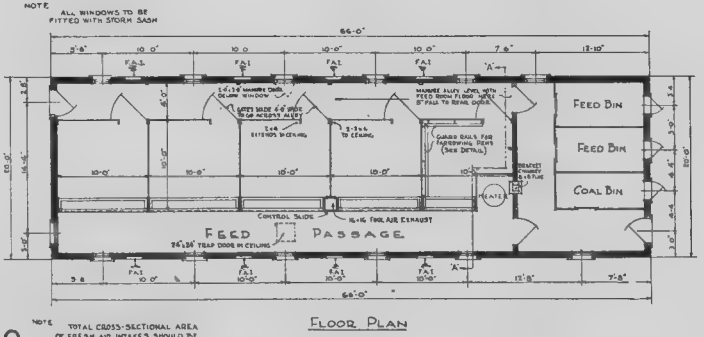
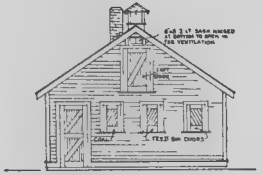

SECTION A-A
DETAIL TO VENTILATOR FRAMING
DETAIL TO GUARD RAILS FOR FARROWING PENS
DETAIL TO CONTROL SLIDE ETC; FOR FOUL AIR DUCT
WALL SECTION THRO AIR INTAKE
TYPICAL WALL SECTION
SCALE - 1" = 1-0

Fig. 24.—Details of wall construction showing fresh air inlets together with detail of ventilator framing. This system of ventilation to be used in buildings shown on Figs 23 and 25.







80.
C.
61.

Fig. 25.—Plan for five pen permanent piggery with Danish floor arrangement.

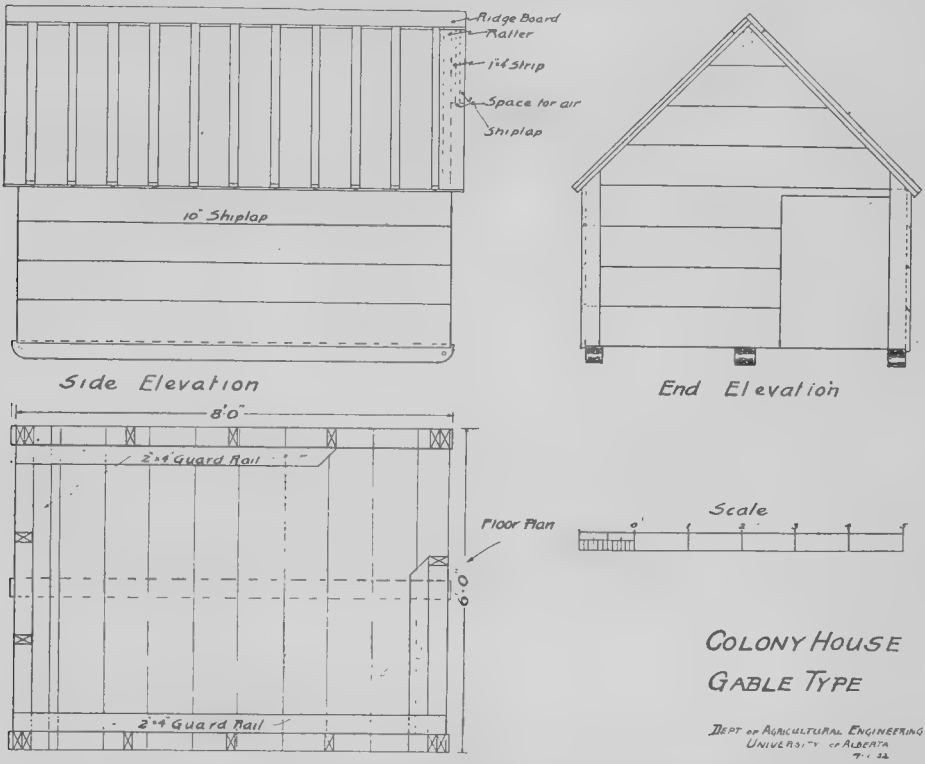


Fig. 26.—Plans for construction of 6′×8′ Gable Type Colony House.

Gable Type Colony House.

Several types of colony houses have been used on the University Farm, but the gable type house shown in Fig. 26 has been found the most satisfactory. This 6′×8′ house can be used practically all the year round. Sows and litters can be accommodated in such houses in the spring after having been removed from the farrowing house, pigs on pasture may be sheltered in them, and when banked with straw they will accommodate fall pigs and brood sows during the winter months. Being portable, they may be moved to fresh ground from time to time and thus assist in avoiding parasitic infection.

The house shown in Fig. 26 is mounted on 3-4″×4″ runners on which the floor is laid, and the framing being erected as shown in the illustration of framing details. Very little further explanation is needed. The second illustration shows the side and end elevation as well as the plan.

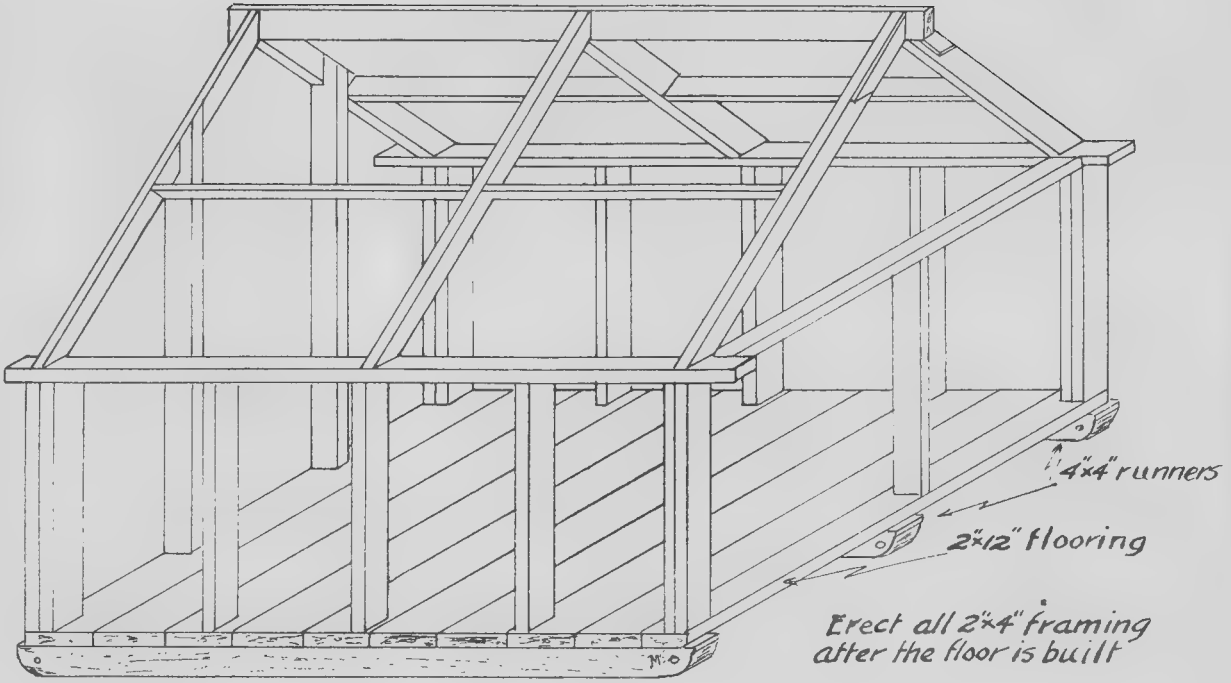


Fig. 27.—Framing details for 6′×8′ Gable Type Colony House.

Self-Feeder for Grain.

The self-feeder shown in Fig. 28 is a one-way type, that is, the pigs feed from one side only. This feeder is large enough to accommodate from ten to one dozen pigs. It might be extended to accommodate a larger number of pigs, and modified so that pigs could feed from both sides.

Attention is drawn to the depth of the feed trough and to the spacing strips across the trough. These strips serve to prevent the pigs from rooting the grain out of the trough. A feeder built according to the plan suggested, and when mounted on a platform, will function with a minimum wastage of grain.

In order to make the details of construction clear, a separate cut has been made showing the framing (see Fig. 29).

The galvanized steel sheet which is shown in the sectional view is very important, and makes a good smooth surface for the grain. The construction of the roof and hinges is very important in order to prevent any leakage of water. It is cheap and easily built; a strip of prepared roofing is nailed on to the shiplap and held by strips of lath. Over the hinge another piece of prepared roofing is nailed, making a water-tight joint.

Self-Feeder for Minerals.

When mineral mixtures are being fed it is advisable that they be fed from a self-feeder such as shown in Fig. 30. This feeder is shown in actual use in the illustration on page 90.

This feeder is smaller than the one for grain, and it is open on both sides. The adjustable slides do not need to be removed very often, and for that reason no special fastener is required. The two nails will hold them in place quite readily. The lid can be made in the same way as the one shown in the self-feeder, with an extra piece of roofing material over the hinges.

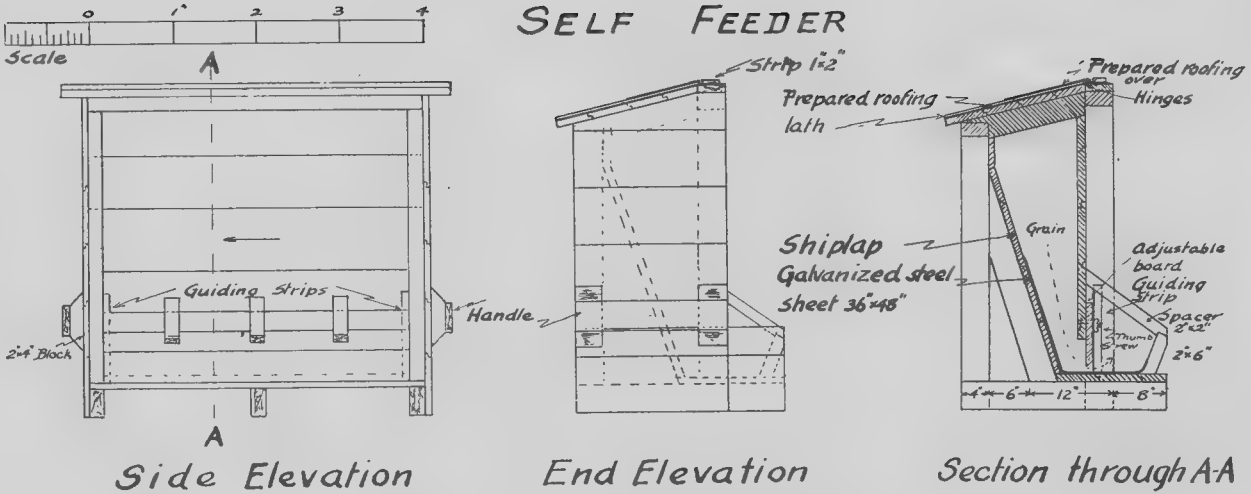


Fig. 28.—Plan for one-way self-feeder for grain.

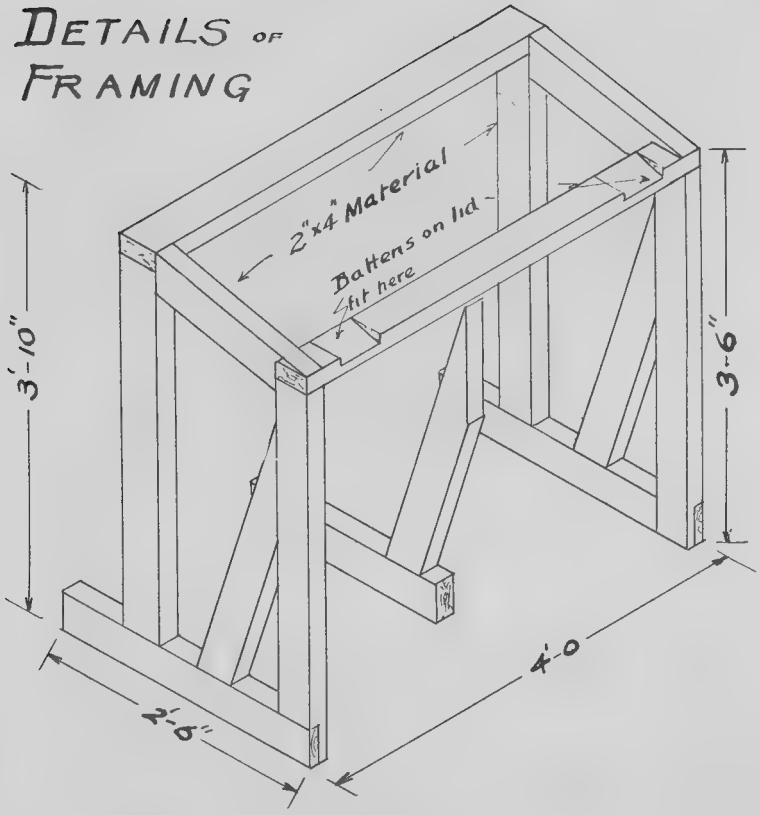


Fig. 29.—Details of framing of self-feeder for grain.

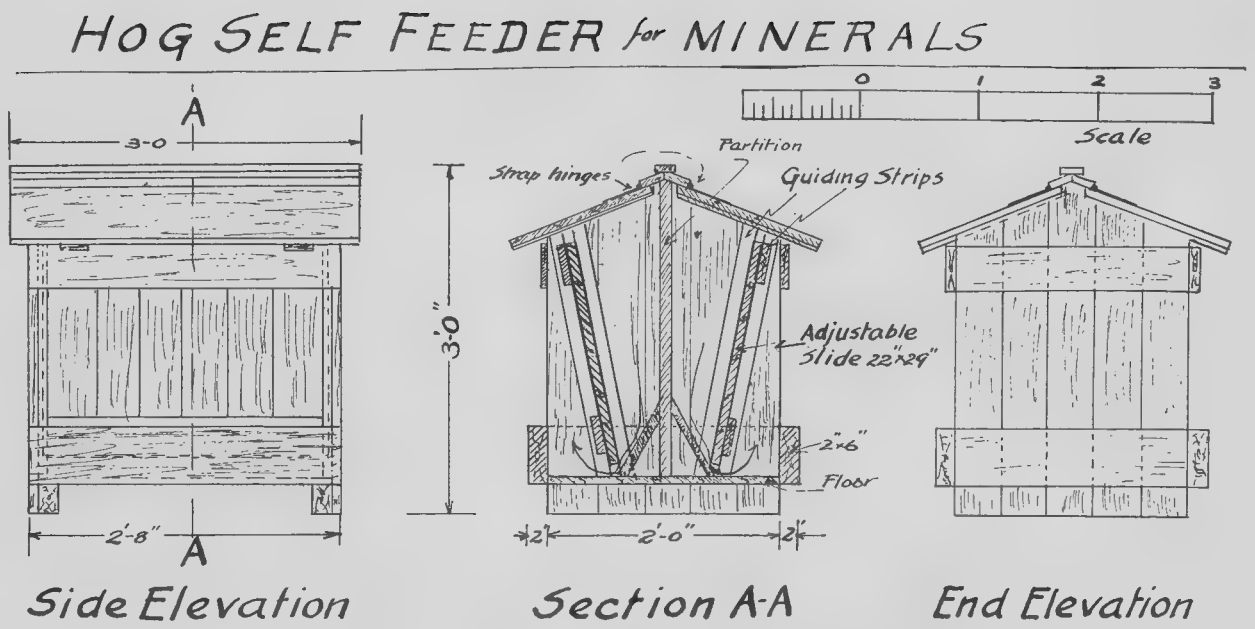


Fig. 30.—Plan for construction of small self-feeder for minerals for pigs.

Fig. 31.—Plan showing construction of hog shipping crate.

Hog Shipping Crate.

Breeders of pure-bred pigs will have occasion to ship pigs to purchasers. Pigs must always be crated, and shipping companies will not accept pigs for shipment unless the crate is well made.

The crate shown in Fig. 31 can be made to suit the size of the pig. The illustration shows a crate that is strongly constructed and will stand shipping well. It will be noticed that most of the boards are 1″×4″ material, with the exception of the two lower boards on the sides and the door and top. The runners are made of 2″×2″.

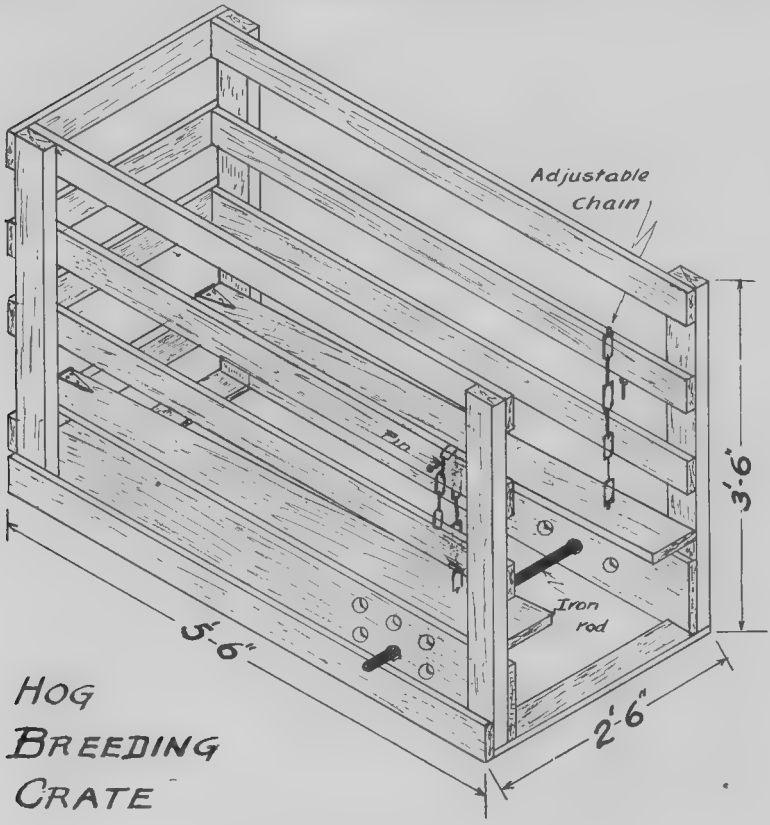


Fig. 32.—Breeding Crate.

Hog Breeding Crate.

It occasionally happens that a small sow must be mated to a large, mature boar. If the sow is not sufficiently developed to support the weight of the boar, the breeding crate shown in Fig. 32 may be utilized to good advantage.

The dimensions of the crate are: Length 5′6″, width 2′ and height 3′6″. The uprights at the corner are made of 2″×4″ material, and the sides may be made of 4″ strips of inch lumber, with a 10″ board at the bottom on each side. The supports for the feet of the boar are hinged at the front end of the crate and may be raised or lowered by means of the adjustable chain indicated in the illustration. An iron rod which slips through holes in the bottom side boards should come just above the hocks of the sow so that she is prevented from backing out of the crate.

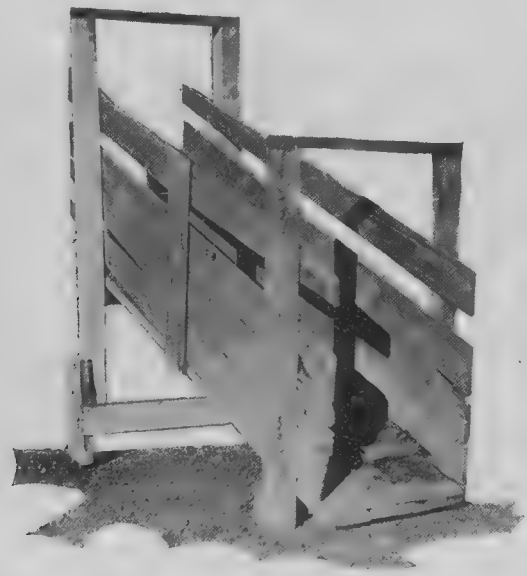


Fig. 33.—Portable Loading Chute. This chute might be improved by equipping in front with a pair of small wheels. When connected with a narrow runway this piece of equipment makes the job of loading pigs an easy one.

Fig. 34.—An automatic waterer attached to heavy barrel provides a means of keeping water in front of the pigs during the summer months.

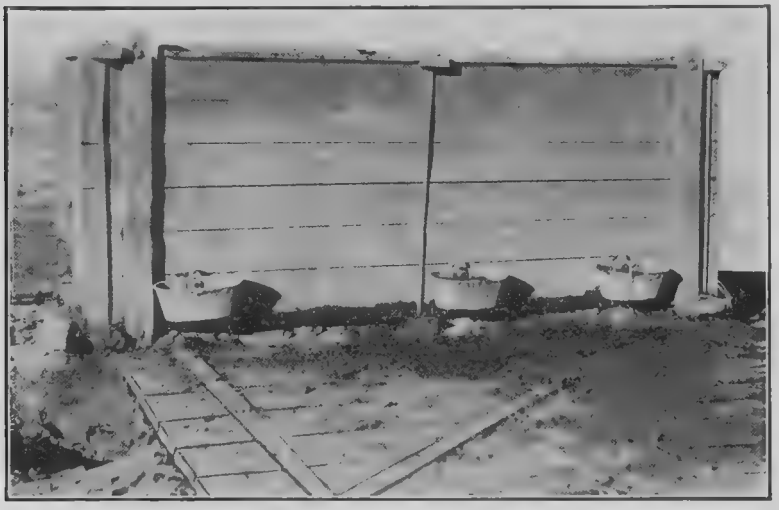


Fig. 35.—The water tank with automatic waterers attached as shown above, may be used to keep water in front of a large number of pigs during the summer months. At the University Farm a herd of thirty sows drink from this tank.

Fig. 36.—The self-feeder for minerals planned in Fig. 30 is shown in actual use in the illustration above.

APPENDIX C.

DISEASES OF SWINE

BY

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In writing a brief description of a few diseases of swine, our object has been to supply the farmers with a short, concise report of those ailments that are found to be most prevalent in the Province. In many districts the services of a veterinary surgeon are not available, and it is to the farmers in these localities that we hope to be able to render some assistance. We would like to draw attention to the fact that in all abnormal conditions of swine, the most effective method to adopt is one of prevention. Many losses can be checked by promptly separating the animals that show peculiar symptoms from the rest, until they are back to normal again. We also believe that those ailments of a non-infectious nature can be largely prevented by proper feeding, housing and care. Those farmers interested in the breeding of swine can profitably study sanitation, quarantine and immunity. We are of the opinion that some swine diseases can be prevented by the establishing of a suitable feeding platform that can be washed, cleaned and disinfected if so desired at frequent intervals. We also believe that some at least of our swine diseases are caused by the allowing of swine to wallow in dirty holes in some part of the pasture. These hog wallows are breeding grounds for bacteria, and some of our swine losses can be traced to this source. We would like to draw attention to the advisability of the frequent cleaning of hog lots, pens and shelters, as well as the feeding troughs. This is a most important factor in disease prevention, and there is no doubt that the thorough cleaning at stated intervals with a liberal amount of slaked lime of the pens and houses, as well as the hog lots, if it is possible to do so, and the careful disinfection of the walls of the pig pens with some reliable antiseptic, will go a long way in the protection of the animal's health. We would also like to explain that many diseases of swine are difficult to diagnose, and for this reason no time should be lost in calling in a veterinary surgeon to diagnose the trouble, as well as to advise the owner as to the proper treatment that should be followed.

Attitude of Sick Swine

It is most important to remember that the general attitude of sick swine is significant and of very great value in making a diagnosis. We would draw to your attention the fact that swine suffering from pneumonia will usually be found lying down, except possibly in the later stages, when the lung capacity is greatly interfered with, and the animal will assume a sitting position. Unsteady gait signifies general weakness, or when the animal is in a debilitated condition. Dragging of the hind quarters is typical of troubles in the joints, nervous disorders and some bone diseases. Parasitic infestation will often cause the animal to move in an uncertain manner, and is probably one of the most common causes for mistaken diagnosis.

Administration of Medicine

The administration of drugs by the mouth to swine is usually a most difficult task, and if given in the form of a drench, frequently pass into the lungs, setting up pneumonia and causing the death of the animal. Therefore, if it is possible, it is advisable to mix medicines in feed or water. If there is a large number of animals to treat, care must be taken that certain individuals do not get too much of the medicine, and for that reason many swine men condemn the giving of medicinal remedies in the food and water. If drugs have to be administered in this manner, one should give same in a small quantity of food and have the animals hungry before giving it to them. Also a small number of animals should be treated at a time. The administration of medicines by capsule is becoming quite popular among many swine breeders. It is a safe and effective method of giving medicines, but the objection to it is that each individual pig must be caught and treated separately.

Aberration of the Appetite

The cause of this condition may be a vice or mania of some kind, and why a perversion of taste occurs in this class of animal is difficult to explain. In some instances it is shown by the animal eating foreign material such as decayed flesh, rotten wood, earth, and in some cases by the sows eating their young. In the last mentioned instances, this depravity of appetite is caused by improper feed during the last few weeks of the gestation period. For this reason, it is advisable to gradually change the feed of the sow some two or three weeks prior to farrowing time, eliminating as far as possible the fat-

forming element. Many swine men claim that the addition of small quantities of tankage to the feed for some ten days or two weeks prior to farrowing will prevent this trouble. Allowing the pigs access to proper mineral mixtures will do a great deal in the prevention of depraved appetite.

Hemorrhagic Septicemia

We think it is generally accepted that this disease is more or less prevalent throughout Alberta. As a rule, it is not fatal, but frequently causes the greatest loss by stunting the animal and producing unthriftiness in a large percentage of the swine on the premises. There is no doubt that the greatest losses occur when the animals are not kept under sanitary conditions and where they are sleeping in wet, damp quarters, or have access to hog wallows or even house themselves in dusty, mouldy straw stacks. In this Province the disease is shown most frequently by affecting the respiratory organs, and is evidenced by the usual symptoms of pneumonia, such as a short, dry cough and a temperature ranging from 103 to 105 degrees F. This will be shown by a purplish reddened condition of the skin along the abdomen and behind the ears and inner surface of the thighs. Occasionally there is a nasal discharge and almost always a diminished appetite. As the disease advances, there is usually extreme weakness and a well-marked staggering gait. If the affected animal lives long enough emaciation takes place. In some instances the acute form is present, and if so, it usually terminates fatally within a few days.

Treatment

Prevention, in the way of improving sanitary conditions, is most important. The sprinkling of pens and houses with disinfectants is helpful. The immediate isolation from the rest of the herd of the infected animals will also aid in preventing the spread of the disease. The affected animals should be kept warm and dry, and should be fed on sloppy feed, such as a milk and bran mixture. The use of bacterins has been tried with varying success. In our opinion, this product, if obtained from a reliable biological house and administered by a capable person, is of considerable value in controlling the condition. Under certain conditions, however, their use may be contra-indicated, but their application should be left entirely to a veterinary practitioner.

Anaemia in Young Pigs

This condition is presumed to be quite prevalent in this Province, and is stated by certain authorities to be due to iron deficiency. It is not found where the young pigs have been exposed to sunlight and where they have plenty of exercise and access to suitable soil and vegetation. It is claimed that the disease can be prevented, and even cured, when only one of these three factors, namely, soil, is supplied. This condition, in our opinion, is controlled entirely by prevention, and if sows that are farrowing have plenty of exercise we believe losses from this source would be entirely eliminated, if the swine men would allow the young pigs to have access to the things mentioned above. The only way to prevent anaemia in suckling pigs is to supplement the sow's milk with an iron salt containing impurities of copper. Each pig should be fed separately with a solution made from 3.6 ounces of iron sulphate (ferric) dissolved in 5 quarts of water. The proper dose would be one teaspoonful, given once a day, and fed as a drench.

Hairlessness in Pigs

This trouble is prevalent in various parts of the Province, and in particular in the regions adjacent to the Rocky Mountains. More cases are seen on some farms than others, and in addition, it seems to be more prevalent some years than others. In some instances, one farm has no losses from this cause whatever, while surrounding farms report considerable losses. It also has been found that on some farms only a portion of the sows will produce hairless pigs, while in other cases practically 100% of the sows farrowing in the spring will produce hairless pigs and in the fall the same sows will give normal ones. It is universally accepted that the cause of hairlessness in pigs is a deficiency of iodine. It has been shown many times that the condition can be eliminated by the administration of this drug to pregnant sows.

Symptoms

The young pig, when farrowed, has a rather typical appearance. It is usually normal in size and either completely devoid of hair or almost practically so. The skin over the shoulders has a wrinkled appearance, and an examination will generally show enlargement of the thyroid glands in the neck.

Prevention

This condition can be prevented by supplying the proper amount of iodine in the ration. In localities where goiter is prevalent two grains of potassium iodide daily to the sows during the gestation period will prevent the condition. The usual way to administer iodine in the proper dose is to mix two ounces of potassium iodide in one gallon of water, and give one tablespoonful to the sow in the feed once a day.

Thumps

(Spasm of the Diaphragm)

Thumps is a condition caused by violent contractions of the diaphragm, and the result of stimulation of a certain nerve in the body. It it most frequently the result of disturbances of the digestive tract; over-loading of the stomach, improper feed, and inflammation of that organ, are all conducive to thumps. It occasionally appears as well in diseases of the respiratory organ.

Cause

Thumps are usually the result of lack of exercise, as well as improper feeding, particularly in young pigs. It may also occur as an indication of inflammation of the stomach and intestines, or the result of a heavy infection of parasites. A large percentage of the animals affected with this condition are, upon examination, found to have parasites either established in the intestinal tract or migrating through the lungs. It may also occur in pneumonia or other respiratory disturbances.

Symptoms

The condition is characterized by a sudden jerking of the flanks accompanied by a sound that is quite distinct. The contractions of the diaphragm sometimes occur in rapid succession and then will be followed by a period apparently normal. The animal will usually be listless, and there are indications as well of indigestion.

Treatment

If the owner is satisfied that the young animal is not infected with parasites, it should be treated with some laxative, such as linseed oil or Glauber's Salts. It should be given plenty of exercise with good sleeping quarters and much sunshine. The diet for a few days at least should be of a laxative nature. If the condition occurs in young pigs only a few days

old, it is advisable to change the feed of the sow and administer a dose of raw linseed oil, varying in quantity from 4 to 10 ounces, depending upon the size and weight of the animal. Should parasites be the cause, however, the animal may be treated with oil of chenopodium, 1 fluid dram to a one-hundred pound animal, this to be followed by one to two ounces of castor oil.

Stomatitis

(Sore Mouth)

This is an inflammation of the mucous membrane of the mouth, and is quite common in swine.

Cause

It may occur in various ways as injury from frozen foods, stubble or bearded grains, as well as from decomposed feeds, fermented silage, hot feeds, poisonous moulds, or bacteria in filthy, stagnant wallows. We have often found that garbage containing washing powders, broken glass, etc., will be the cause.

Symptoms

The trouble is indicated by a profuse salivation or drooling from the mouth. The membranes are found to be hot to the touch and the animal shows difficulty in eating, or refuses to eat at all. Not infrequently, the mouth gives off an offensive odor. Thirst as a rule is greatly increased. In young pigs the condition is shown by infrequent attempts to nurse, followed in a few days by depression, gauntness and quite frequently by diarrhoea.

Treatment

The condition can easily be prevented by proper care in the feeding of this class of animal. If garbage is fed, injurious materials should be kept out of such feed. Feeds given on clean floors or platforms are not so likely to become contaminated as those fed upon the ground. The animals should be kept away from wallows in the hog lot when the symptoms appear. They should be given access to clean, cold water. The addition of chlorate of potash to the drinking water is beneficial. The amount given is about three teaspoonfuls to a gallon of water. The animal should be placed upon a diet of milk and bran until it shows signs of recovery. Any abrasion of the mucous membranes should be treated with tincture of iodine.

Agalactia

(Lack of Milk in Sows)

This is a condition common in brood sows where there is a sudden cessation of milk secretion and the mammary gland cells fail to produce more. Serious losses in this Province have occurred on numerous occasions from this source. Most cases of lack of milk usually occur from three to five days following farrowing, and the first sign of the condition noticed in the young pigs is their gauntness and weakness, and their persistent attempts to obtain milk. It is doubtful if there is any relationship to this condition and the character of the feed of the sow, as it has been noted that it occurs under all conditions, and breed, age, and general conditions of the sow have apparently no influence upon the case. It is generally considered that the cause of the trouble is due to some disturbances of the endocrine glands. On farms where it is common, we recommend the administration of maltine or finely ground barley. This may be soaked from twelve to twenty-four hours and kept at a warm temperature for that period of time. We generally recommend that this be given for a few days prior to farrowing, and continued for at least two weeks thereafter. We feel quite sure that if these instructions are followed many of the cases of this condition can be prevented. The administration of certain gland extracts to the sow increase the milk flow, but should be used only under the direction of a veterinary surgeon.

The Feeding of Orphan Pigs

One of the serious consequences of Agalactia in sows is the loss of suckling pigs. If some method of successfully feeding them could be devised, it would not only be profitable, but of very great advantage to the swine breeder, particularly if he is anxious to preserve them for breeding purposes. It is advisable in the feeding of this particular class of animal to provide a food, the composition of which is as closely related to that of the mother's milk as possible. The following is a carefully worked out, modified, milk formula that has been fairly successful in meeting the requirements of orphan pigs. It consists of one pound cow's milk, one pound lime water, one-quarter pound separator cream, one-half pound sugar. These ingredients should be mixed in clean vessels, and the young pigs from one to ten days old should be given about one-half a pound, divided into five different quantities spread over a period of twenty-four hours. It should be borne in mind that young pigs should not gain in

weight for the first ten days, and if one can hold them in a healthy condition for that period of time, the chances of losing them will be greatly diminished. If the pigs reach the age of about ten days, the composition of the milk can be gradually changed by reducing the sugar, cream and lime water, and at the age of three weeks straight cow's milk may be safely fed. One of the most important factors in feeding orphan pigs is the great care that is necessary in having all utensils cleaned properly. If this is done, little loss may be expected from indigestion or digestive disturbances.

Lousiness

This is probably one of the most common parasites affecting swine. It is a blood-sucking louse, and probably one of the largest of its kind. These parasites are usually located behind the ears, in the flank or elsewhere on the body. The chief danger caused by lousiness is the absorption of blood and the irritation to the skin, which occasionally spreads in quite an alarming manner. The result of the inflammatory condition arising from these parasites is that the swine will be restless, and probably will not thrive as well as otherwise, When large numbers of swine are infected, the best method of combatting the trouble is to drive them through a dipping vat every ten days for at least three or four dippings. The sleeping quarters should be carefully cleaned and disinfected, which may be done with a brush, or better still, with a spray. In the way of medicinal treatment, coal tar preparations will be satisfactory, the strength of which will depend upon the preparation used. If there are only one or two animals to be treated, this may be done by hand, and if so, the preparation used should be applied most thoroughly. Some swine men erect rubbing posts in their hog lots as a method of preventing louse infection. These posts are situated in the pens at convenient spots, and ropes are wound tightly around them to the height of the animals. The ropes are then saturated with crude petroleum at regular intervals, and the swine will apply this oil to themselves by rubbing against the posts.

Rheumatism

Rheumatism in swine is usually met with in two types, one affecting the muscles, the other the joints. Either type may be due to the absorption of poisons into the system, as well as the result of exposure to cold and dampness. The reason that swine seem to be susceptible to rheumatism is the fact that their blood circulation is more limited than in other animals.

The symptoms of this condition are indicated by difficult locomotion, and in the articular type, the joints are swollen and painful. Lameness is well-marked, and if the two hind legs are affected, the animal has very great difficulty in walking. In some instances there is marked loss of appetite. The temperature may be slightly elevated and the breathing increased. In the way of treatment, medicine remedies have been found unavailing, and it is doubtful if any effort along this line is worth-while. The animal should be kept as comfortable as possible and in some building that is dry, warm and free from drafts. The diet should consist of sloppy feed; green vegetables are said to be beneficial, as they cause a cooling effect upon the blood. We believe that swine affected with rheumatism should not be kept for breeding purposes.

Sunburn

On account of the small amount of pigment in the skin of light colored hogs they are frequently injured by sunlight. This is especially noticeable in Alberta, where the sun is particularly strong for so many hours in the day during the summer months. In certain districts where shade is lacking, sunburn is very prevalent, particularly where white pigs are kept. The condition is characterized by a redness and inflammation of the superficial layers of the skin. Where the condition extends over a long period of time, the skin may become thick and fibrous in appearance. Swine affected with sunburn do not thrive, and show a harsh skin and abnormal coat. In the way of treatment, about the only thing one can do is to supply the animals with shade from the direct rays of the sun, and should inflammation be well-marked, cooling antiseptic solutions should be applied. The administration of olive oil, rubbed gently into the inflammed areas will also be found to be useful.

Worms in Swine

It is doubtful if the swine of this Province are as badly infected with intestinal parasites as those of eastern Canada. On account of the severity of the weather here and climatic conditions generally, it is doubtful if we will ever have the serious problem to contend with that is so well known in some other parts of Canada. There is no disputing the fact, however, that the swine from certain parts of this Province are infected with the round worm, and that the farmers in these localities would do well to treat their swine regularly for parasitic infestation.

Symptoms

In a large percentage of cases no symptoms whatever are manifested. If, however, the hog is infected with a large number of these worms, digestive disturbances take place as well as irritation of the lungs and bronchial tubes, and the parasites may be so numerous that pneumonia will result. One of the serious symptoms of this condition is that it prevents the growth of the animal and impairs the general health. The parasites are usually found through the digestive tract, and vary in length from three to ten inches. They set up an irritation of the mucous membrane of the alimentary canal and interfere with the absorption of food. The pigs become unthrifty, have enlarged abdomens as well as rough coats.

Treatment

Where a herd of swine is known to be badly infested, preventive measures go a long way in eliminating this trouble, and sanitation cannot be too strongly recommended. The essential steps in swine sanitation are the careful and thorough cleaning and scrubbing with hot water and lye of the pens at regular intervals. Prior to farrowing, the sow should be scrubbed carefully, especially around the udder, with some soapy water, and then placed in a clean farrowing pen. The young pigs should be raised on clean pasture and away from older hogs, other than their mother, until they are at least four months old, when they are considered to be healthy enough to withstand the effects of parasitic infestation. Where permanent farrowing houses are not used, and where the sows are frequently changed on to new ground, the washing of the sows may be unnecessary. Where this is done, many swine owners are adopting the system of administering some parasiticide to their swine at regular intervals. There are various medicinal remedies advocated as a vermifuge for swine. We believe that Nema, sold in capsule form, a recent scientific remedy placed upon the marked by the Parke, Davis and Company, Walkerville, Ontario, is probably one of the safest, most effective and economic preparations known so far. Its great convenience of administration makes it particularly popular among swine breeders. Oil of Chenopodeum, given in doses of one drop for every two pounds of live weight, is also recommended. Santonin is reliable and popular with many swine men. It can be given in two and one-half grain doses for a fifty-pound hog, and can quite easily be mixed with milk. The main objection to this drug is that it is expensive, especially where a large number of animals have to

be treated. The success of any parasiticide depends upon the manner of administration, and it should be borne in mind that those advocated above should be given on an empty stomach. Before treating swine for parasites, it should be first proven conclusively that the animals are infected, and then the drug and dose should be carefully selected. I think it is generally agreed that it is much better to dose each pig individually than to treat a large number of swine in one group. The animals treated should be kept in a small enclosure, and the materials passed from them following treatment should be gathered carefully and burned or buried. In this way most of the parasites and their ova can be effectively destroyed.

GESTATION TABLE FOR BROOD SOWS (based on 112-day pragnancy period)

Date Bred	Date Due	Date Bred	Date Due	Date Bred	Date Due	Date Bred	Date Due	Date Bred	Date Due	Date Bred	Date Due	Date Bred	Date Due	Date Bred	Date Due	Date Bred	Date Due	Date Bred	Date Due	Date Bred	Date Due	Date Bred	Date Due	Date Bred	Date Due
Jan.	Apr.	Feb.	May	Mar.	June	Apr.	July	May	Aug.	June	Sept.	July	Oct.	Aug.	Nov.	Sept.	Dec.	Oct.	Jan.	Nov.	Feb.	Dec.	Mar.		
1	23	1	24	1	21	1	22	1	21	1	21	1	21	1	21	1	21	1	21	1	21	1	23		
2	24	2	25	2	22	2	23	2	22	2	22	2	22	2	22	2	23	2	22	2	22	2	24		
3	25	3	26	3	23	3	24	3	23	3	23	3	23	3	23	3	24	3	23	3	23	3	25		
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6	28	6	29	6	26	6	26	6	26	6	26	6	26	6	26	6	27	6	26	6	26	6	28		
7	29	7	30	7	27	7	28	7	27	7	27	7	27	7	27	7	28	7	27	7	27	7	29		
8	30	8	31	8	28	8	29	8	28	8	28	8	28	8	28	8	29	8	28	8	28	8	30		
	May		June	9	29	9	30	9	29	9	29	9	29	9	29	9	30	9	29		Mar.	9	31		
9	1	9	1	10	30	10	31	10	30	10	30	10	30	10	30	10	31	10	30	9	1		Apr.		
10	2	10	2		July		Aug.	11	31		Oct.	11	31		Dec.		Jan.	11	31	10	2	10	1		
11	3	11	3	11	1	11	1	12	Sept.	11	1		Nov.	11	1	11	1		Feb.	11	3	11	2		
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30	22	....	....	30	20	30	20	31	19	30	20	30	19	30	20	30	20	30	19	30	22	30	21		
31	23	....	....	31	21	....	....	....	....	....	....	31	20	31	21	....	....	31	20	....	....	31	22		

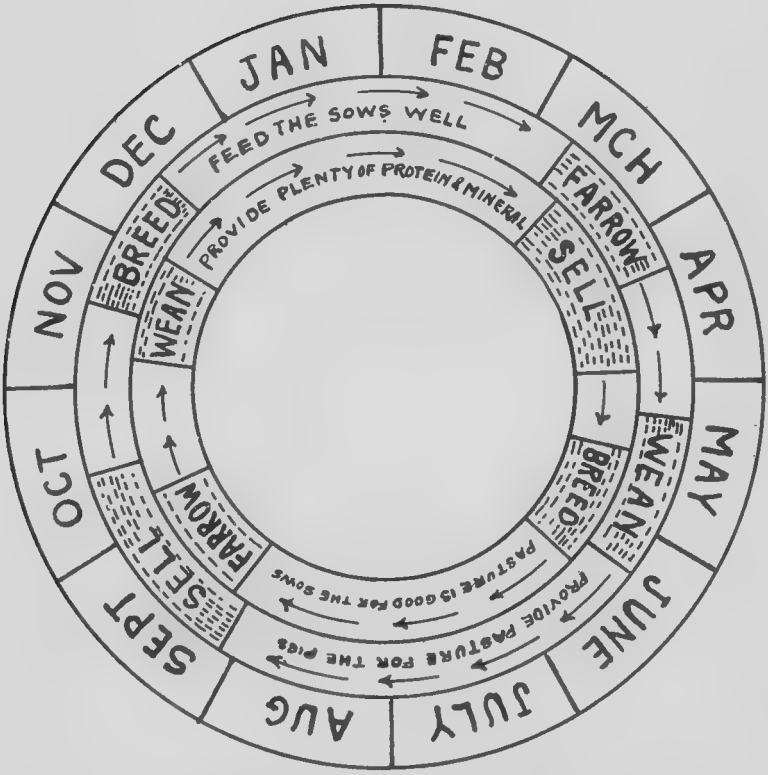

Fig. 32.—A Pig Production Calendar. Outer circle, months; centre circle, spring litters; inner circle, fall litters.

Date Due

DUE CAM MAR 09'79			
MAR 15 RETURN			

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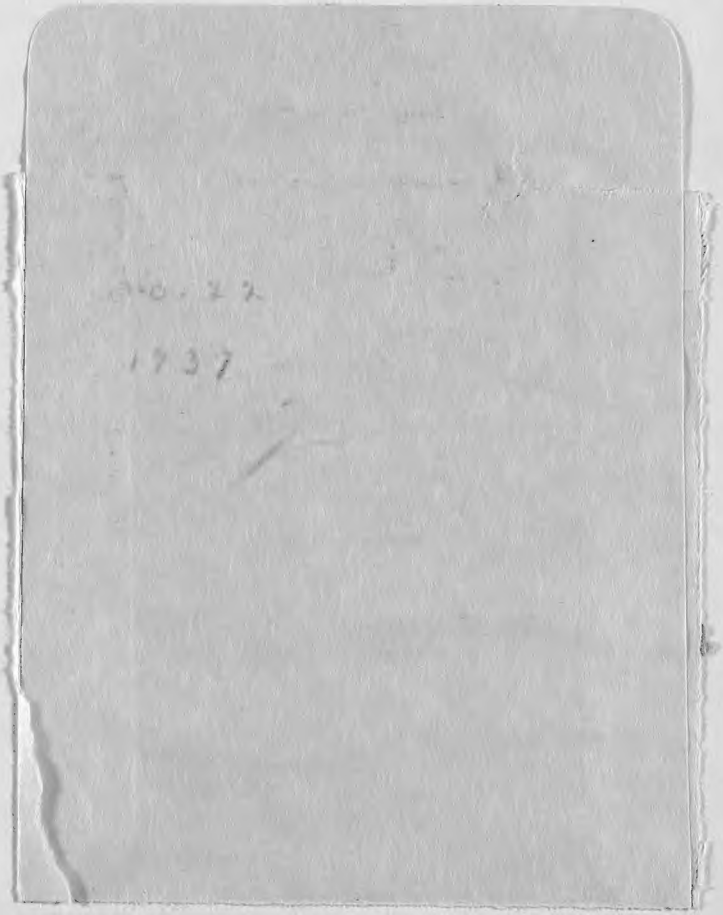

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